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NATIONAL DAM INSPECTION PROGRAM. GREENLICK RUN DAM (NDI NUMBER --ETC(U)
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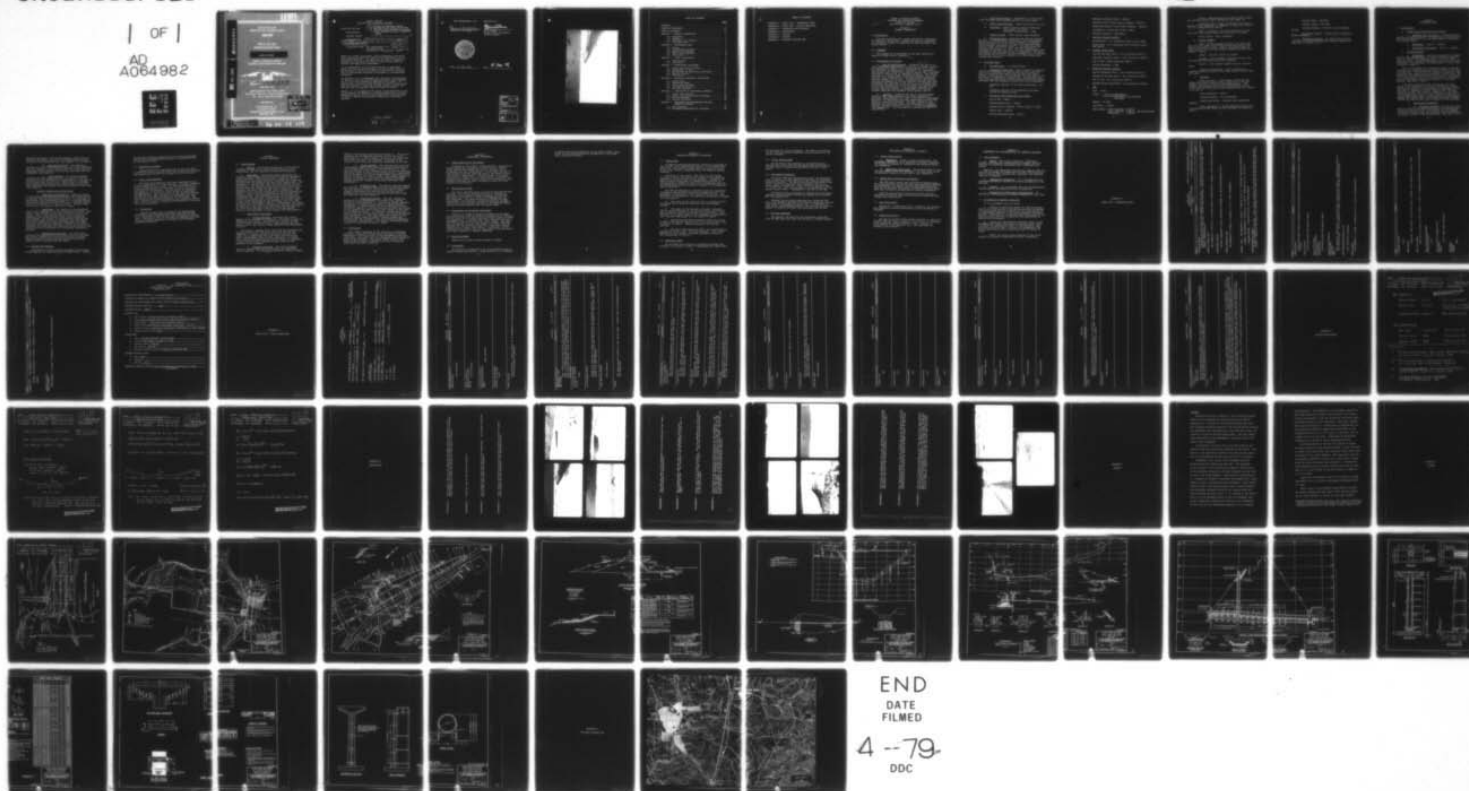
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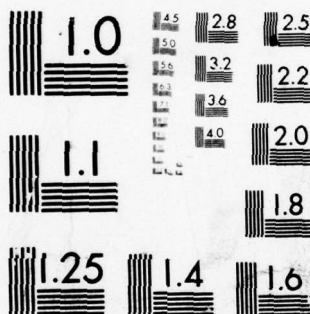
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LEVEL I

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OHIO RIVER BASIN
GREENLICK RUN, FAYETTE COUNTY
PENNSYLVANIA

NDI No. Pa.-355
GREENLICK RUN DAM

DACW31-78-C-0052

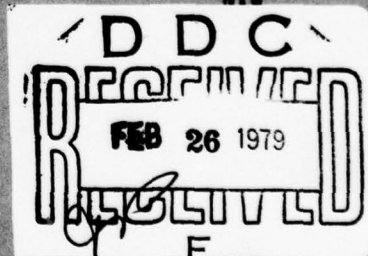
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



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PREPARED BY
GAI CONSULTANTS, INC.
570 BEATTY ROAD
MONROEVILLE, PENNSYLVANIA 15146
OCTOBER 1978



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PHASE I REPORT
National Dam Inspection Program

Greenlick Run Dam
Pennsylvania
Fayette County

6 National Dam Inspection Program.
Greenlick Run Dam (NDI Number PA-355),
Ohio River Basin, Greenlick Run, Fayette
County, Pennsylvania. Phase I Inspection
Report.

Greenlick Run

11 OCT
27 September 1978

15 DACTW 34-78-C-0052

Inspection Team - GAI Consultants, Inc.
570 Beatty Road
Monroeville, Pennsylvania 15146

12 76 p.

Based on a visual inspection, past performance, and available engineering data, the facility is considered to be in excellent condition. The emergency spillway is capable of passing the flow resulting from a storm of PMF intensity without overtopping the embankment.

It is recommended that the owner develop an operations manual for the use and maintenance of the outlet works at the facility as well as a warning system for the notification of downstream residents in the event of an embankment emergency.

In addition, it is recommended that the owner take measures to curtail travel by unauthorized vehicles on the embankment and to repair and reseed all damaged or bare areas. If impractical, provision should be made to protect those areas that are subject to vehicular traffic against rutting and erosion with a protective layer of gravel or stone.

Finally, it is recommended the excess riprap observed in the outlet channel be removed to eliminate undesirable tailwater conditions and the facility be inspected on an annual basis in order to detect any hazardous conditions which might develop.

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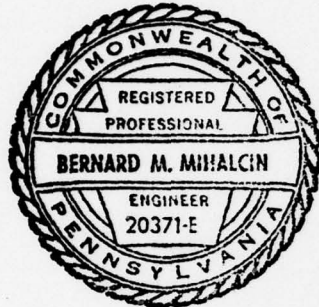
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GAI Consultants, Inc.

Approved by:

Bernard M. Mihalcin
Bernard M. Mihalcin, P.E.

G. K. Withers
G. K. WITHERS
Colonel, Corps of Engineers
District Engineer



Date 21 Nov 78

Date 18 Dec 78

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OVERVIEW PHOTOGRAPH OF GREENLICK RUN DAM

TABLE OF CONTENTS

	<u>Page</u>
SYNOPSIS	i
OVERVIEW PHOTOGRAPH.	iii
TABLE OF CONTENTS.	iv
SECTION 1 - GENERAL INFORMATION.	1
1.0 Authority.	1
1.1 Purpose.	1
1.2 Description of Project	1
1.3 Pertinent Data	2
SECTION 2 - ENGINEERING DATA	6
2.1 Design	6
2.2 Construction Records	7
2.3 Operational Records.	8
2.4 Other Investigations	8
2.5 Evaluation	8
SECTION 3 - VISUAL INSPECTION.	9
3.1 Observations	9
3.2 Evaluation	10
SECTION 4 - OPERATIONAL PROCEDURES	11
4.1 Normal Operating Procedure	11
4.2 Maintenance of Dam	11
4.3 Maintenance of Operating Facilities.	11
4.4 Warning Systems.	11
4.5 Evaluation	11
SECTION 5 - HYDROLOGIC/HYDRAULIC EVALUATION.	13
5.1 Design Data.	13
5.2 Experience Data.	13
5.3 Visual Observations.	14
5.4 Overtopping Potential.	14
5.5 Spillway Adequacy.	14
SECTION 6 - EVALUATION OF STRUCTURAL INTEGRITY	15
6.1 Visual Observations.	15
6.2 Design and Construction Techniques	15
6.3 Past Performance	15
6.4 Seismic Stability.	15
SECTION 7 - ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES.	16
7.1 Dam Assessment	16
7.2 Recommendations/Remedial Measures.	16

TABLE OF CONTENTS

APPENDIX A - CHECK LIST - ENGINEERING DATA
APPENDIX B - CHECK LIST - VISUAL INSPECTION
APPENDIX C - HYDRAULICS AND HYDROLOGY
APPENDIX D - PHOTOGRAPHS
APPENDIX E - GEOLOGY
APPENDIX F - FIGURES
APPENDIX G - REGIONAL VICINITY MAP

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
GREENLICK RUN DAM
NDI# PA-355, PENNDR# 26-97

SECTION 1
GENERAL INFORMATION

1.0 Authority.

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

1.1 Purpose.

The purpose is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Greenlick Run Dam is an earth embankment approximately 1,200 feet in length (excluding emergency spillway) with a maximum height of 52 feet. The structure is essentially a standard U. S. Department of Agriculture, Soil Conservation Service design and is equipped with both a service and an emergency spillway. The service spillway is a single stage, reinforced concrete, drop inlet, vertical riser connected to a 30-inch diameter horizontal concrete conduit at its base. Provisions for draining the lake are provided by an 18-inch diameter concrete pipe that discharges into the base of the riser at its upstream face. The service spillway and low level conduit are located just to the left of dam center. The emergency spillway is an unlined vegetated channel of trapezoidal cross-section located along the left abutment (see Figures 2 and 3).

b. Location. Greenlick Run Dam is located across Greenlick Run, approximately 3-1/2 miles northeast of Scottdale, Pennsylvania, less than 1 mile south of Bridgeport Reservoir and approximately 1 mile downstream of Green Lick Reservoir (currently drained). The dam, reservoir, and watershed are contained within the Connellsville, Donegal, Mammoth, and Mount Pleasant U.S.G.S. 7.5 minute quadrangles (see Appendix G). The coordinates of the dam are N40°07.0' and W79°32.1'.

c. Size Classification. Intermediate (52 feet high, 3,920 acre-feet total storage capacity to top of dam).

d. Hazard Classification. High (see Section 3.1.c.5).

e. Ownership. Fayette County Planning Commission
Court House, 3rd Floor
Uniontown, Pennsylvania 15401

f. Purpose of Dam. Flood control and recreation.

g. Historical Data. Greenlick Run Dam was designed by the U. S. Department of Agriculture, Soil Conservation Service as part of a flood control system in the Jacobs Creek Watershed, which was to consist of three dams and a stream channel improvement project. Construction of the facility began on June 12, 1972, and was completed as scheduled on December 18, 1973. No major modifications have been made to the structure since its completion. The area surrounding the reservoir has been developed into a park and the dam now serves a dual purpose as a flood control and recreational facility.

1.3 Pertinent Data.

a. Drainage Area. 7.3 square miles.

b. Discharge at Dam Site. Daily records of reservoir levels and discharges are not recorded at this facility. High water reports are compiled by the SCS after major storms. These reports can be obtained from the owner or the SCS office in Washington, Pennsylvania. Discussions with local SCS representatives directly involved with the project indicated that the emergency spillway has never discharged.

Discharge Capacity of the Service Spillway = 135 cfs.

Discharge Capacity of the Emergency Spillway = 24,000 cfs (design value).

c. Elevation (feet above mean sea level).

Top of Dam - 1089.7.

Maximum Design Pool - 1084.0.

Maximum Pool of Record - 1076.2 (April 7, 1977).

Normal Pool - 1072.0.

Service Spillway Crest - 1072.0.

Emergency Spillway Crest - 1080.6.

Upstream Portal Invert Outlet Conduit - 1038.25.

Downstream Portal Invert Outlet Conduit - 1033.40.

Streambed at Centerline of Dam \approx 1035.

Maximum Tailwater - Not known.

d. Reservoir Length (miles).

Maximum Pool \approx 1.5 (elevation 1089.7 top of dam).

Normal Pool \approx 1.0 (elevation 1072.0 service spillway crest).

e. Storage (acre-feet).

Service Spillway Crest \approx 1574 (elevation 1072.0).

Emergency Spillway Crest \approx 2576 (elevation 1080.6).

Top of Dam \approx 3920 (elevation 1089.7).

Design Surcharge \approx 1344.

f. Reservoir Surface (acres).

Service Spillway Crest \approx 100 (elevation 1072.0).

Emergency Spillway Crest \approx 130 (elevation 1080.6).

Top of Dam \approx 167 (elevation 1089.7).

Maximum Design High Water \approx 145 (elevation 1084.0).

g. Dam.

Type - Earth.

Length - 1,200 feet (embankment)

1,500 feet (embankment and emergency spillway)

Height - 52 feet.

Top Width - 18 feet.

Side Slopes - Lower upstream 2.93H:1V
Upper upstream 2.43H:1V (as-constructed)
Downstream 2.43H:1V

Zoning - Impervious core with more pervious shell and internal blanket drain downstream (see Figure 4).

Impervious Core - Figure 4 indicates the central portion of the embankment is composed of impervious clays of U.S.C.S. designations CL and CH.

Cutoff - Figures 4 and 5 show details of a variably deep clay cutoff trench, 12 feet wide at the base.

Grout Curtain - None indicated.

h. Outlet Conduit.

Type - 18-inch diameter concrete, low level conduit with its intake at the upstream toe and gated at the base of the vertical riser. Flow is discharged from the riser by means of a 30-inch diameter concrete conduit (see Figures 7 and 8).

Length \approx 330 feet (inlet to outlet).

Closure - Gate located at the base of the riser and operated from atop the outlet structure.

Access - Gate control located atop the vertical riser.

Regulating Facilities - Rate of drawdown is regulated solely by means of the valve control located atop the riser.

i. Spillway.

Type (service) - Single stage, reinforced concrete, drop inlet vertical riser connected to a 30-inch diameter concrete, horizontal discharge conduit. The conduit runs beneath the structure perpendicular to the centerline and discharges at the downstream toe (see Figures 7, 8, and 9).

Crest Elevation - 1072.0.

Upstream Channel - Not applicable.

Downstream Channel - Riprap-lined trapezoidal channel.

Type (emergency) - Unlined vegetated channel cut into natural ground along the left abutment (see Figures 3 and 5).

Channel Width - 300 feet.

Channel Length \approx 500 feet.

Upstream Channel - Unlined cut into natural ground.

Downstream Channel - Broad grassey floodplain beyond embankment.

j. Regulating Outlets. Low level outlet can be regulated via the 18-inch diameter concrete conduit as described in Section 1.3.h.

SECTION 2 ENGINEERING DATA

2.1 Design Data.

a. Design Data Availability and Sources.

1. Hydrology and Hydraulics. A complete design analysis as prepared by the U. S. Department of Agriculture, Soil Conservation Service is available from Soil Conservation Service files.

2. Embankment. Same as 1 (above).

3. Appurtenant Structures. Same as 1 (above).

b. Design Features.

1. Embankment. Available construction drawings indicate the dam embankment is a zoned earthfill structure with a 2.93H:1V lower upstream slope, a 2.43H:1V upper upstream slope, a 2.43H:1V downstream slope, and an 18-foot wide crest. The embankment is constructed of 3 major zones as shown on Figure 4.

Zone I is composed of an impervious material placed as the core zone and comprises the largest portion of the dam cross-section. Zone II material consists of gravelly clays and shale which comprise the outer shell on each face. The downstream toe between Stations 7+50 and 12+50 (see Figure 4) is constructed of Zone III material which is composed of material excavated from the left abutment or oversized material from Zones I and II.

A drainage system has been incorporated into the design of the embankment to control the phreatic surface. The drainage system is located below the downstream earthfill and is composed of a drain trench 4 feet wide and extending to rock (see Figure 6, Appendix F). The drain trench discharges into the outlet structure through two 12-inch diameter drain pipes. Special provisions including a chimney and blanket drain are utilized to control seepage through the exposed rock surface adjacent to the spillway.

2. Appurtenant Structures.

a) Principal Spillway. The service spillway is a single-stage drop inlet structure consisting of a reinforced concrete riser, a horizontal 30-inch diameter reinforced concrete pipe, and an impact basin type energy dissipator located at the discharge end. The riser is a 39-

foot high structure. The 30-inch diameter conduit has its intake at the base of the riser and extends approximately 240 feet to the downstream toe (see Figures 3, 7, 8, and 9).

b) Emergency Spillway. The emergency spillway is a trapezoidal channel cut into natural ground on the left abutment. The design provides for a dike along the right side of the channel to direct the flow away from the embankment (see Figure 3).

c) Outlet Conduit. An 18-inch diameter concrete low level outlet pipe has its intake at the upstream toe of the embankment and discharges into the base of the upstream face of the riser. This conduit is equipped with a slide gate mounted on the inside face of the riser which controls flow through the 30-inch diameter outlet pipe (see Figure 7).

c. Specific Design Data and Criteria.

1. Hydrology and Hydraulics. Hydraulic design of the facility was based on criteria and data presented in: 1) National Engineering Handbook of the U. S. Department of Agriculture, Soil Conservation Service; 2) National Weather Bureau Publications TP-40 and TP-49; and 3) PennDER Publication No. 41 (contains "C" curve criteria). Specific data and criteria are listed in Section 5, herein.

2. Embankment. All aspects of the embankment design were prepared by the Soil Conservation Service. The design brief includes all the basic elements of earth dam design. Logs of test boring and test pits, results of laboratory soil classification tests, moisture-density relationships, and results of consolidation, permeability and triaxial shear tests are presented within the report. Results of stability analyses are summarized for steady state and full drawdown conditions. Review of the data as presented indicated that the investigation and design of the facilities are in accordance with acceptable engineering practice.

3. Appurtenant Structures. The appurtenant structures incorporated into the facility are for the most part proven standard Soil Conservation Service designs. Extensive design calculations are presented within the design report, available from SCS files.

2.2 Construction Records.

Construction records including bi-weekly construction status reports are contained within PennDER files. A daily

construction narrative prepared by the on-site representative of the Soil Conservation Service is available at the SCS Harrisburg office.

2.3 Operational Records.

Conversations with representatives of the local Soil Conservation Service present during the inspection indicated that operational records are not kept for this facility.

2.4 Other Investigations.

No formal investigations have been performed on this facility subsequent to its construction. The owner performs a site inspection once a year. An SCS representative is always present during the inspection to aid in the overall evaluation of the facility. A brief report is prepared and submitted to the SCS for their review and subsequent recommendations. Under provisions of the agreement between the SCS and the owner, the owner is responsible for the correction of any deficiencies noted in the report. The Soil Conservation Service performs a site inspection once a year. A brief report is prepared and submitted to the owner for review and action.

2.5 Evaluation.

Engineering data were provided by the Pennsylvania Department of Environmental Resources (PennDER) and the U. S. Department of Agriculture, Soil Conservation Service (SCS). Sufficient data are available to indicate the structure was formally designed in accordance with accepted engineering practice.

SECTION 3 VISUAL INSPECTION

3.1 Observations.

a. General. The general appearance of this project indicates the dam and its appurtenances require little maintenance, and are currently in excellent condition.

b. Embankment. During the visual inspection, no evidence of any seepage was observed through the embankment or the abutments. The general overall condition of the embankment is considered excellent, although the inspection was made when the reservoir was well below normal pool. The embankment is seeded with crown vetch and requires little maintenance. The upstream slope is partially covered with a durable sandstone riprap that was fully visible due to the unusually low water level at the time of inspection. The embankment crest is well aligned and no crest settlement was evident. Tire tracks were observed on both the crest and downstream berm. Conversations with Mr. Bill Bowers who represented the local Soil Conservation Service during the inspection indicated that a local farmer is provided access to the fields downstream of the embankment from the right abutment (see Photographs 8 and 9). Consequently, the crest and lower berm are readily accessible to unauthorized vehicles. In addition, a path that runs vertically from the crest to the lower berm and down to the toe in the approximate center of the embankment is also evident (see Photograph 8).

c. Appurtenant Structures.

1. Service Spillway. The drop inlet riser appears to be in excellent condition. No cracks or signs of weathering are evident. The manual gate control located atop the riser was covered with a steel cylinder for protection and is said to be in good condition (see Photographs 2 and 3).

The owner's representative indicated that vandalism has created problems with the riser since the facility was completed. A recent incident involved riprap and "Saccrete" being dumped down the riser shaft, rendering the outlet and emergency gate totally inoperable. In August 1978, repairs were made and the outlet system is reportedly in good working order although the gate valve was not operated in our presence.

2. Emergency Spillway. The unlined channel spillway located along the left abutment has reportedly never discharged. Its dimensions generally conform to those

shown on the contract drawings (see Figure 3). The overall condition of the emergency spillway is excellent (see Photograph 6). A small swamp is located at the downstream end of the spillway. The condition is thought to be related to poor drainage conditions downstream of the dam.

3. Outlet Conduit. The only portion of the low level outlet conduit which could be visually inspected was the discharge end (see Figure 7 and Photograph 7). The concrete portion of the discharge basin is in good condition with only slight evidence of any deterioration. Immediately beyond the basin is a riprap-lined channel approximately 20 feet in length and 20 feet in width. The channel appears to contain an excess of riprap that may obstruct discharge through the outlet channel during high discharges (see Photograph 7).

4. Reservoir Area. The general area surrounding the reservoir is characterized by gentle to moderate slopes that are sparsely wooded. Greenlick Run Dam is a multi-purpose recreational and flood control project and is designed with various picnic and boating facilities along the shoreline (see Photograph 3).

5. Downstream Channel. The area immediately downstream of the embankment is a broad, flat, grassy floodplain (see Photograph 5). The stream channel meanders through this floodplain which begins to narrow further downstream. At approximately one mile downstream a large industrial complex is located along the northern edge of the stream channel that would likely suffer damage in the event of an embankment breach. In addition, several homes are located near the stream channel about 1-1/4 miles downstream (see Photograph 11). Many more homes and industries that house and employ possibly several hundred persons are located along the floodplain near the downstream community of Scottdale, Pennsylvania. As a result, the hazard classification of Greenlick Run Dam is "high".

3.2 Evaluation.

The overall condition of the facility is considered excellent. Positive measures should be taken to curtail unauthorized vehicular travel on the embankment crest and lower berm. Bare areas near the embankment center should be repaired and reseeded. The excess riprap found in the outlet channel should be removed so as not to create an undesirable tailwater condition.

SECTION 4 OPERATIONAL PROCEDURES

4.1 Normal Operational Procedures.

According to the owner's representatives, there are no formal operational procedures at the facility. Excess inflow passes down through the service spillway and is discharged into the stream below. A cold water release is also located along the upstream face of the vertical riser (see Figure 9, Appendix F). The manual gate valve that controls flow through the low level conduit is reportedly opened several times a year to insure its operability. The emergency spillway has never discharged during the brief history of the facility.

4.2 Maintenance of Dam.

The dam is designed to be a virtually maintenance-free facility. Any routine maintenance that is required is performed by the Fayette County Department of Parks and Recreation and often as a result of recommendations by SCS inspectors. No formal maintenance program has been established. Nevertheless, routine maintenance includes mowing the crest, clearing overgrowth, and removing debris that may have accumulated near the outlet works.

4.3 Maintenance of Operating Facilities.

There is no formal maintenance program for the operating facilities; however, owner's representatives indicated that the gate valve is opened several times a year to insure its operability. In August 1978, major remedial work was performed on the service spillway valve system. The reservoir was drained in order that damage by vandals could be repaired and the existing "nonrising" valve stem could be replaced by a "rising" valve stem. In addition, a steel casing has been placed over the gate control atop the vertical riser to protect it against vandalism.

4.4 Warning Systems.

There are no formal warning systems in effect.

4.5 Evaluation.

The facility is designed to be self-regulating and to require minimal maintenance. Formal manuals are recommended

to ensure continued operability of the outlet system, and a formal warning system should be implemented in case emergency conditions develop.

SECTION 5 HYDROLOGIC/HYDRAULIC EVALUATION

5.1 Design Data.

A complete hydrologic/hydraulic analysis as prepared by the U.S.D.A., Soil Conservation Service, is available from SCS files. The report includes design criteria and procedures, stage curves, hydrograph data, and complete routing analysis.

According to this report, the crest of the primary spillway is set at elevation 1072.0 which is the elevation required to store 50 years of wet sediment. PennDER's "C" curve criteria (explained in PennDER Publication No. 41, "Construction or Repair of Dams" 1975) established that the dam should have spillway facilities capable of discharging a flow of 6450 cfs.

The dam was designed in accordance with the principles outlined in the National Engineering Handbook of the U. S. Department of Agriculture, Soil Conservation Service. The following is a synopsis of the hydrologic principles developed for this project.

a. The crest of the riser was set at elevation 1072.0 to provide for a 100-acre recreation pool and sediment storage.

b. The crest of the emergency spillway, elevation 1080.6, was established by routing the runoff from the 100-year frequency, one-day and ten-day storm rainfalls. This resulted in a storage capacity for floodwater retardation of 1001 acre-feet equivalent to 2.56 inches of runoff.

c. The Design High Water Elevation 1084.0 was established by routing the runoff from a 10.0-inch rainfall, said to equal 6.36 inches. Maximum discharge realized was 4569 cfs.

d. The top of dam elevation 1089.7 was established by routing the runoff from a 26.0-inch rainfall. This runoff amounted to 21.67 inches. Maximum discharge realized in this routing was 24,658 cfs.

5.2 Experience Data.

No pertinent data relative to emergency spillway performance is available as owner's representatives report that

the spillway has never discharged. The general appearance of the facility indicates adequate past performance of the service spillway.

5.3 Visual Observations.

On the date of the inspection, no conditions were observed that would indicate the appurtenant structures of the dam could not operate satisfactorily during a flood event.

5.4 Overtopping Potential.

The ratio "PMF Peak Flow/Drainage Area" was determined from an empirical curve supplied by the Corps of Engineers, Baltimore District. The curve used was the Ohio River Basin Curve. Based on this curve and a drainage area of 7.3 square miles, Peak PMF $Q/A = 1620$ cfs/sq mi, and Peak PMF $Q = 11,826$ cfs. The size category is "intermediate" and the hazard rating "high". Consequently, the SDF is the PMF.

Calculations were performed to evaluate the overtopping potential using spillway and storage capacities during the PMF (see Appendix C).

Assuming the spillway discharges as a broad-crested weir, the emergency spillway has a maximum discharge capacity equivalent to approximately 23,000 cfs. A comparison of peak inflow with maximum discharge indicates the spillway is capable of passing the peak flow resulting from the PMF.

5.5 Spillway Adequacy.

The facility can pass the peak discharge associated with the PMF event and hence the spillway is deemed adequate.

SECTION 6
EVALUATION OF STRUCTURAL INTEGRITY

6.1 Visual Observations.

a. Embankment. Based on visual observations, the embankment appears to be in excellent structural condition. No evidence of seepage or instability was detected during the inspection.

b. Appurtenant Structures. The appurtenances of this facility appear to be well designed. All were found to be in excellent condition at the time of the inspection.

6.2 Design and Construction Techniques.

The SCS design report and calculations obtained from SCS files indicate the facility has been adequately designed in conformance with modern accepted engineering practice. Many of its features are proven, standard SCS designs which have been previously incorporated in similar structures.

Project specifications along with design drawings reinforce our opinion that the structure is stable in both concept and construction.

6.3 Past Performance.

Except for a malfunction due to vandalism, the facility has reportedly operated problem-free and has performed as designed.

6.4 Seismic Stability.

The dam is located within Seismic Zone No. 1, and it is thought that the static stability is sufficient to withstand minor earthquake induced dynamic forces. However, no calculations, investigations, etc., were performed to confirm to this opinion.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS FOR REMEDIAL MEASURES

7.1 Dam Assessment.

a. Safety. The visual inspection, operational history, and available engineering data suggest that the facility is adequately maintained and in excellent condition.

Hydraulic and hydrologic calculations indicate that the spillway is capable of discharging the peak flow resulting from a storm of PMF intensity and, therefore, the spillway capacity is adequate.

b. Adequacy of Information. The available data are considered sufficient to make an accurate assessment of the facility.

c. Urgency. It is suggested that the recommendations listed below be implemented as soon as practical.

d. Necessity for Additional Investigations. No additional investigations are deemed necessary at this time.

7.2 Recommendation/Remedial Measures.

It is recommended that the owner:

a. Develop an operations manual for use and maintenance of the outlet works at the facility as well as develop a warning system that will provide for the notification of all downstream residents in the event emergency conditions develop. Provisions for round-the-clock surveillance of the facility during periods of unusually heavy precipitation should also be included.

b. Curtail the unauthorized vehicular travel on the embankment and repair and reseed any damaged (bare) areas. If control of unauthorized travel is not practical, some provision should be made to protect the embankments from rutting and erosion with a protective layer of gravel or stone.

c. Remove the excess riprap observed in the outlet channel to eliminate undesirable tailwater conditions.

APPENDIX A

CHECK LIST - ENGINEERING DATA

CHECK LIST
ENGINEERING DATA
NAME OF DAM Greenlick Run Dam
DESIGN, CONSTRUCTION, OPERATION ID # NDI# PA-355, PennDER# 26-97
PHASE I

ITEM REMARKS SHEET 1

AS-BUILT DRAWINGS

Available on micro-fiche from PennDER and SCS files. 37 Drawings by U.S.D.A., Soil Conservation Service dated 10-71 entitled, "Jacobs Creek Watershed, Multiple Purpose Dam PA-656, Fayette County, Pennsylvania."

REGIONAL VICINITY MAP

See Appendix G (U.S.G.S. 7.5 minute series, Connellsville, Donegal, Mount Pleasant quadrangles).

CONSTRUCTION HISTORY

Project inspector's daily narrative available at the SCS Harrisburg office.

TYPICAL SECTIONS OF DAM

See Appendix F, Figure 4 (Drawing 4 of 37; "Fill Placement").

OUTLETS - PLAN See Appendix F, Figure 7 (Drawing 10 of 37, "Principal Spillway Excavation").

- DETAILS See Appendix F, Figures 8, 9, and 10 (Drawings 13, 17, 18 of 37).

- DISCHARGE RATINGS Contained within SCS Design Report.

RAINFALL/RESERVOIR RECORDS

No daily records available. Flood reports prepared after major storms document high pool levels. Copies of the reports are available from the owner and at the SCS Uniontown office.

DESIGN REPORTS

Formal SCS design report available from SCS files at Washington and Harrisburg, Pennsylvania, offices.

GEOLOGY REPORTS

Contained within the design report.

DESIGN COMPUTATIONS
HYDROLOGY & HYDRAULICS
DAM STABILITY
SEEPAGE STUDIES

Contained within the design report.

MATERIALS INVESTIGATIONS
BORING RECORDS
LABORATORY
FIELD

See "as-built" Drawing Nos. 33-36 entitled, "Logs of Test Holes." Records available in SCS Design Report. Daily inspector's report available at SCS Harrisburg office.

POST-CONSTRUCTION SURVEYS OF DAM

See "as-built" drawings.

BORROW SOURCES

See Appendix F, Figure 2 (Drawing 2 of 37, "Plan of Storage Area").

MONITORING SYSTEMS

None.

MODIFICATIONS

Replaced, "non-rising" valve stem with a "rising" valve system in August, 1978.

HIGH POOL RECORDS

High pool of record = 1076.2 (April 7, 1977) - Emergency spillway has never discharged.

POST CONSTRUCTION ENGINEERING
STUDIES AND REPORTS

None.

PRIOR ACCIDENTS OR FAILURE OF DAM
DESCRIPTION
REPORTS

None, other than vandalism.

MAINTENANCE
OPERATION
RECORDS

None.

ITEM	REMARKS	ID # PA-355	SHEET 4
------	---------	-------------	---------

SPILLWAY PLAN See Appendix F, Figure 3 (Drawing 3 of 37, "Plan of Structural Works").

SECTIONS See Appendix F, Figure 5 (Drawing 7 of 37, "Cutoff Trench").

DETAILS

OPERATING EQUIPMENT
PLANS & DETAILS

See Appendix F, Figure 9 (Drawing 17 of 37, "Riser Accessories").

NDI# PA-355

CHECK LIST ID # PennDER# 26-97

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 7.3 square miles

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1072.0 (1574 ac-ft)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1080.6 (2576 ac-ft)

ELEVATION MAXIMUM DESIGN POOL: 1084

ELEVATION TOP DAM: 1089.7

SPILLWAY DATA:

- a. Crest Elevation: Service 1072.0; emergency 1080.6
- b. Type: Service-1stage "Drop Inlet; Emergency-Natural Channel
- c. Crest Length: Service-15 ft; Emergency-300 ft.
- d. Channel Length Service-Not applicable; Emergency ≈ 500 ft.
- e. Location Spillover Service at dam center; Emergency at left abutment
- f. Number and Type of Gates None

OUTLET WORKS:

- a. Type 18-inch diameter concrete pipe
- b. Location Dam center at base of riser
- c. Entrance Inverts 1038.25
- d. Exit Inverts 1033.40
- e. Emergency Draindown Facilities Manually operated gate

HYDROMETEOROLOGICAL GAGES:

- a. Type None
- b. Location -
- c. Records None

MAXIMUM NON-DAMAGING DISCHARGE: Not known (emergency spillway has never discharged)

APPENDIX B

CHECK LIST - VISUAL INSPECTION

CHECK LIST
VISUAL INSPECTION
PHASE 1

DAM NAME Green Lick Run Dam COUNTY Fayette STATE PA NDI # PA-355
 TYPE OF DAM Earth HAZARD CATEGORY High ID # PennnDER #26-97
 DATE(S) INSPECTION 27 September 78 WEATHER Sunny TEMPERATURE 75°

POOL ELEVATION AT TIME OF INSPECTION 1062 M.S.L. TAILWATER AT TIME OF INSPECTION 1034 M.S.L.

(27 Sept. 78)

INSPECTION PERSONNEL:

<u>J. P. Nairn (GAI)</u>	<u>Bill Bowers (SCS)</u>	<u>Bruce Paptick (Fayette</u> <u>County)</u>
<u>S. R. Michalski (GAI)</u>	<u>Bill Briggs (SCS)</u>	
<u>D. L. Bonk (GAI)</u>	<u>Howard Clay (Fayette County)</u>	

(Oct. 78)

J. P. Nairn

B. M. Mihalcin

D. L. Bonk RECORDER

EMBANKMENT

ID# PA-355

Sheet 1

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

SURFACE CRACKS

None observed.

UNUSUAL MOVEMENT OR
CRACKING AT OR BEYOND
THE TOE None observed.

SLOUGHING OR EROSION OF
EMBANKMENT AND ABUTMENT
SLOPES None observed.

VERTICAL AND HORIZONTAL
ALIGNMENT OF THE CREST
Good.

RIPRAP FAILURES

None observed. Riprap appears to be composed of a calcareous sandstone known locally as the Loyalhanna Limestone.

EMBANKMENT

ID # PA-355

SHEET 2

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

EMBANKMENT CREST
AND SLOPES

Tire tracks are visible across the entire length of the embankment crest and downstream berm. In addition, similar tracking was observed running vertically on the downstream face at the approximate center of embankment as well as along the junction of the embankment and right abutment could lead to erosion problems if not curtailed or periodically maintained.

JUNCTION OF EMBANKMENT
AND ABUTMENT, SPILLWAY
AND DRY

Good.

ANY NOTICEABLE SEEPAGE

Swampy area observed in natural ground beyond the emergency spillway. A small amount of water is impounded in this area that is not believed to result from seepage but rather from poor drainage.

STAFF GAGE AND RECORDER

None observed.

DRAINS

Toe drain outlets located at the outlet basin. Drains were not discharging during the inspection.

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	Very minor spalling observed in the concrete portion of the outlet basin. No concrete deterioration was noted at the vertical riser intake.	
INTAKE STRUCTURE	Low level intake was submerged during the visual inspection and was not observed. The vertical riser crest was visible due to the low pool level and appeared to be in excellent condition.	
OUTLET STRUCTURE	Good condition. No discharge was observed through the outlet conduit or the toe drains projecting through the outlet basin wingwalls on either side of the outlet conduit during the inspection.	
OUTLET CHANNEL	Trapezoidal or near rectangular channel with a riprap channel floor extending approximately 20 feet from the outlet basin. An apparent excess of riprap was observed at the discharge end of the outlet basin which could create tailwater effects.	
EMERGENCY GATE	Located upstream of the embankment crest and at the base of the vertical riser, the emergency gate is controlled manually from atop the riser. Recently, (August 1978), a new riser stem and protective cover for the control were added.	

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONCRETE WEIR

None.

APPROACH CHANNEL

Sloping unlined channel located at the left abutment.

DISCHARGE CHANNEL

Natural channel emergency spillway, 300 feet wide at the control section, discharges into a broad (in excess of 1000 feet wide) and relatively flat floodplain immediately downstream of the embankment.

BRIDGE AND PIERS

None observed.

GATED SPILLWAY

ID #PA-355

SHEET 5

VISUAL EXAMINATION OF		OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL		N/A	
APPROACH CHANNEL		N/A	
DISCHARGE CHANNEL		N/A	
BRIDGE AND PIERS		N/A	
GATES AND OPERATION EQUIPMENT		N/A	

VISUAL EXAMINATION

MONUMENTATION/SURVEYS

None observed.

OBSERVATION WELLS

None observed.

WEIRS

None observed.

PIEZOMETERS

None observed.

OTHERS

None observed.

30

RESERVOIR

ID # PA-355

SHEET 7

VISUAL EXAMINATION OF

OBSERVATIONS

REMARKS OR RECOMMENDATIONS

SLOPES

Gentle to moderate slopes surround the reservoir. This area has been cleared and developed as a recreational facility. The slopes steepen away from the reservoir but within the watershed and are thickly wooded.

SEDIMENTATION

None observed.

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Narrow channel meanders through a broad, flat floodplain downstream of the embankment. The first downstream obstructions are a wooded railway trestle and a concrete roadway bridge located approximately 1-1/4 miles downstream.	
SLOPES	Flat.	
APPROXIMATE NO. OF HOMES AND POPULATION	Several homes are located approximately 1-1/4 miles downstream of the embankment. Four of these homes appear to be precariously close to the streambed. Others along with a manufacturing plant located about one mile from the embankment are high enough above the streambed that it is likely they will incur only minor damage as a result of an embankment breach.	
	Many more homes and industries are located along the floodplain further downstream near the community of Scottdale, Pennsylvania, which could be effected by an embankment breach.	
	Estimated population - 500 to 1,000 (including those employed by local industries).	

APPENDIX C
HYDRAULICS/HYDROLOGY

SUBJECT DAM SAFETY INSPECTION
GREENLICK RUN DAM
BY DLB DATE 9-29-78 PROJ. NO. 78-501-355
CHKD. BY EJM DATE 10-18-78 SHEET NO. 1 OF 4



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DAM STATISTICS

MAXIMUM HEIGHT - 52 FEET

(FIELD MEASUREMENT)

DRAINAGE AREA - 7.3 SQ. MI

(PLANIMETERED OFF U.S.G.S.
7.5 MINUTE MAP QUADRANGLES)

STORAGE CAPACITY - 2576 AC-FT

(REF 1, SECTION 3, pg 2)

SIZE CLASSIFICATION

DAM SIZE - INTERMEDIATE

(REF 2: TABLE 1)

HAZARD RATING - HIGH

(FIELD OBSERVATION)

REQUIRED SDF - PMF

(REF 2: TABLE 3)

REFERENCES

- 1: "PA-656, DESIGN REPORT, JACOBS CREEK WATERSHED", U.S.D.A.
SOIL CONSERVATION SERVICE, COLLEGE PARK, MARYLAND 1969
- 2: "RECOMMENDED GUIDELINES FOR SAFETY INSPECTION OF DAMS"
DEPT. OF THE ARMY - OFFICE OF CHIEF ENGINEER, APPENDIX D
- 3: NATIONAL ENGINEERING HANDBOOK, SECTION A (HYDROLOGY), U.S.D.A., SOIL
CONSERVATION SERVICE, COLLEGE PARK, MARYLAND 1969
- 4: STANDARD HANDBOOK FOR CIVIL ENGINEERS
F.S. MERRITT, MCGRAW-HILL 1976

SUBJECT DAM SAFETY INSPECTION
GREENLICK RUN DAM
BY DLB DATE 9-29-78 PROJ. NO. 78-501-355
CHKD. BY EJM DATE 10-19-79 SHEET NO. 2 OF 4

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$$\text{PMF (PEAK FLOW) / AREA} = 1620 \text{ cfs/sq.mi.}$$

(REF: C of E CURVE,
OHIO RIVER BASIN)

$$\text{PMF} = (1620 \text{ cfs/sq.mi.}) (7.3 \text{ sq.mi.}) = 11,826 \text{ cfs}$$

$$\text{PEAK PMF } Q = 11,826 \text{ cfs} = Q_{\text{IMAX}}$$

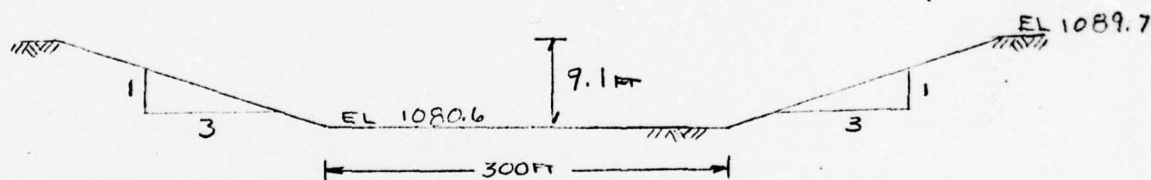
SPILLWAY CAPACITY

VEGETATED EARTH SPILLWAY:

SPILLWAY CREST ELEVATION 1080.6

TOP OF DAM ELEVATION 1089.7

LENGTH OF SPILLWAY CREST - 300 FEET



NOT TO SCALE

NOTE: DIMENSIONS ARE BASED ON FIELD MEASUREMENTS. ELEVATIONS ARE TAKEN FROM DESIGN DRAWINGS TITLED "JACOB CREEK WATERSHED, MULTIPLE PURPOSE DAM PA-656, FAYETTE COUNTY, PENNSYLVANIA" (REF: DWG 3 OF 37, DATED 9-71)

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SUBJECT DAM SAFETY INSPECTION
GREENLICK RUN DAM
BY DLB DATE 9-29-78 PROJ. NO. 78-501-355
CHKD. BY EJM DATE 10-19-78 SHEET NO. 3 OF 4

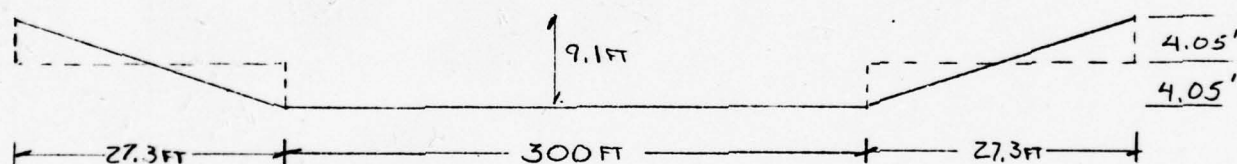


(FROM REF 3, STD DWG NO. ES-175, SHEET 9 OF 9, DATE 11-67)

MAXIMUM SPILLWAY DISCHARGE $\approx 27,500$ CFS

MAXIMUM DISCHARGE (27,500 CFS) > PEAK INFLOW (11,826 CFS)

CONSIDER THE SPILLWAY CONTROL SECTION AS A BROAD CRESTED WEIR



BREADTH OF CREST = 30 FEET

(SEE NOTE: BOTTOM SHEET 2)

C = DISCHARGE COEFFICIENT = 2.63

(REF 1: TABLE 21-15)

NOTE: THE ABOVE COEFFICIENT IS APPLICABLE TO BOTH THE 300 FT SECTION UNDER 9.1 FT OF HEAD AS WELL AS THE TWO 27.3 FT SECTIONS UNDER 4.05 FT OF HEAD

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SUBJECT DAM SAFETY INSPECTION
GREENLICK RUN DAM
BY DLB DATE 9-29-78 PROJ. NO. 78-501-355
CHKD. BY EVM DATE 10-18-78 SHEET NO. 4 OF 4



$$Q_1 = C L_1 H_1^{3/2} = \text{FLOW ACROSS CENTER (300 FT) SECTION}$$

$$L_1 = 300 \text{ FT}$$

$$H_1 = 9.1 \text{ FT}$$

$$Q_1 = (2.63)(300)(9.1)^{3/2} = 21,659 \text{ CFS}$$

$$Q_2 = C L_2 H_2^{3/2} = \text{FLOW ACROSS END (27.3 FT) SECTION}$$

$$L_2 = 27.3 \text{ FT}$$

$$H_2 = 4.05 \text{ FT}$$

$$Q_2 = (2.63)(27.3)(4.05)^{3/2} = 585 \text{ CFS}$$

$$Q_{\text{TOTAL}} = Q_1 + 2Q_2 = (21,659 \text{ CFS}) + 2(585 \text{ CFS})$$

$$Q_{\text{TOTAL}} \approx 23,000 \text{ CFS}$$

ONCE AGAIN:

MAXIMUM DISCHARGE (23,000 CFS) > PEAK INFLOW (11,826 CFS)

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APPENDIX D
PHOTOGRAPHS

PHOTOGRAPH 1 View looking north of the emergency spillway (main embankment in the background). The inlet to the outlet works can be seen on the upstream slope immediately above the parked car just right of center.

PHOTOGRAPH 2 Detailed view of the intake structure.

PHOTOGRAPH 3 View looking east from the crest of the embankment. The intake structure can be seen just beyond the guardrail.

PHOTOGRAPH 4 View looking south from the right abutment showing a public highway which crosses the dam upstream of the embankment crest.



2



4



1



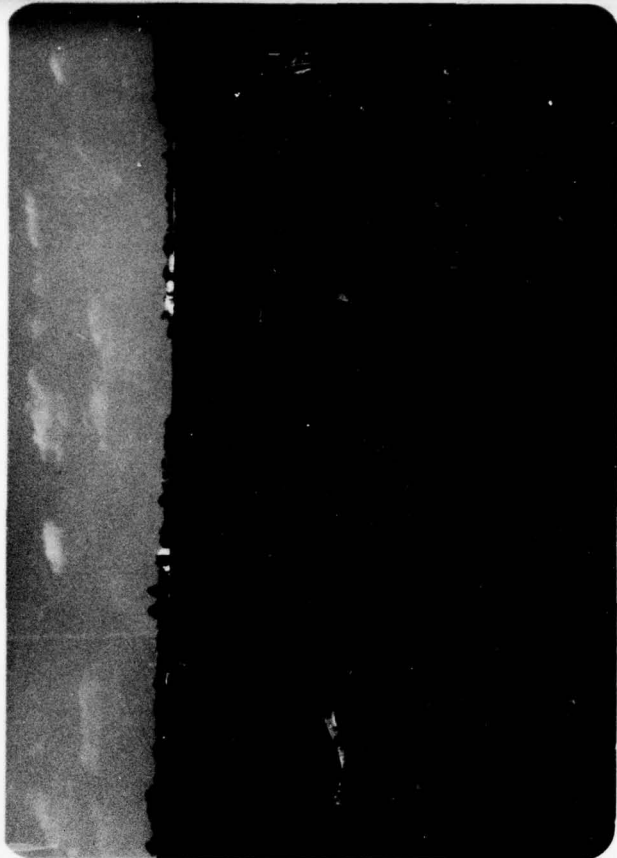
3

PHOTOGRAPH 5 View from the crest of the embankment looking downstream along (west) natural channel of Greenlick Run.

PHOTOGRAPH 6 View looking south from the crest of the embankment across the emergency spillway. The discharge from the spillway is from left to right.

PHOTOGRAPH 7 Detail view of the outlet structure. Note the embankment toe drain outlet in the right wingwall (left in photo). Note also the excessive riprap at the outlet apron.

PHOTOGRAPH 8 View looking north along the downstream slope of the embankment. The access road on the embankment slope leads to the crest just out of the view to the right. A narrow strip extending from the crest to the toe of the embankment can be seen just above the outlet works. This trail was apparently made by off-road recreational vehicles.



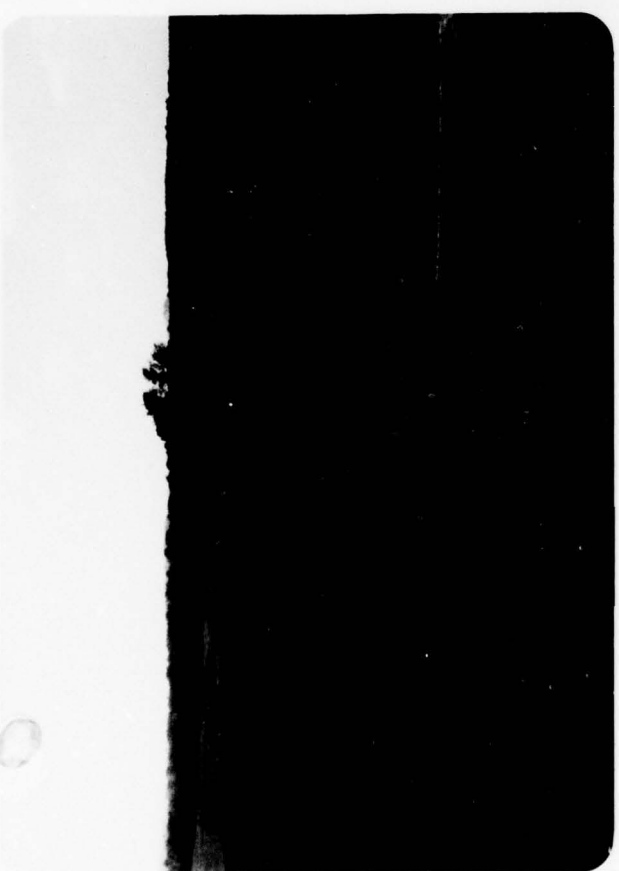
8



6



7



5

PHOTOGRAPH 9

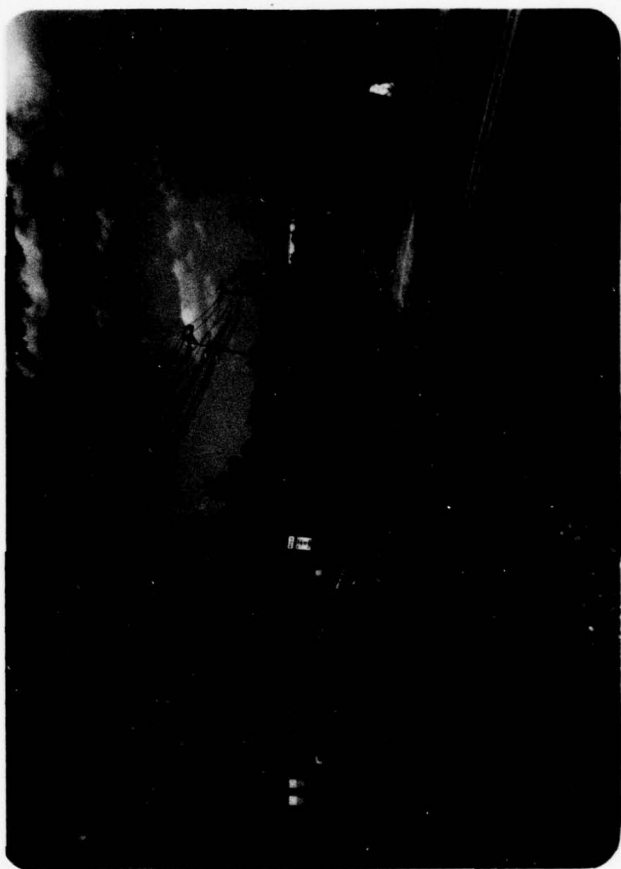
View along the downstream toe of the embankment from the right abutment. The road in the foreground provides access to the embankment crest and downstream from and to the fields downstream of the dam (to right).

PHOTOGRAPH 10

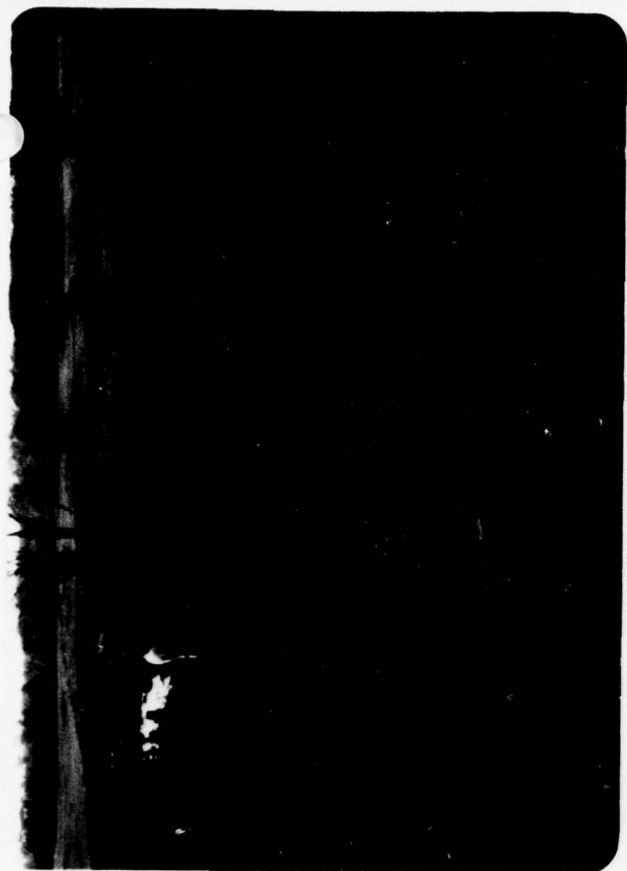
View looking northwest at the area downstream of the emergency spillway. The ponded water is on natural ground and apparently is the result of grading operations blocking the natural drainage outlet of this area.

PHOTOGRAPH 11

This view is looking northeast at the first obstruction approximately one mile downstream of the embankment. The house to the left of the view is the first permanent residence of the Jacobs Creek floodplain below the dam. The structure at the far end of the railroad tracks is in an industrial complex located about one mile west of the dam.



10



9



APPENDIX E

GEOLOGY

Geology *

Greenlick Run Dam is located in the Pittsburgh Plateau Section of the Appalachian Plateaus Province of western Pennsylvania. Portions of the watershed extend east into the Allegheny Mountains Section of the aforementioned province. The embankment lies approximately 1,300 feet east of the confluence of Greenlick Run and Jacobs Creek. The area immediately downstream of the embankment is actually part of the Jacobs Creek floodplain.

Structurally, the site lies on the west flank of the Chestnut Ridge Anticline which generally strikes N30°E. The strata in the immediate vicinity of the dam site dip northwest at approximately 400 feet per mile or 4 to 5 degrees.

Sedimentary rock strata of the Conemaugh Group of Pennsylvanian Age underlie the dam site. The uppermost strata exposed is the Connellsville sandstone which occurs in the emergency spillway on the left abutment and above top of dam on the right abutment. Underlying the Connellsville is a sequence of primarily siltstone interbedded with a small amount of shale, limestone and some sandstone. These strata, locally known as the Laconing beds, occur in both abutments. The Morgantown sandstone underlies the Laconing beds and occurs beneath the entire site. It is exposed on the centerline in an old abandoned quarry on the left abutment, and occurs immediately beneath the alluvium in the floodplain. In the site area the Morgantown sandstone is very constant

and persistent. The sandstone is cross bedded, massive to thin bedded and has two major joint systems, one striking nearly perpendicular to the dam centerline, the other striking nearly parallel to the centerline. Both joint systems have nearly vertical dip. Coefficients of permeability in the Morgantown sandstone ranged from immeasurable in the unweathered zone to 1.9×10^{-2} cm/sec in one drill hole at a depth of 17.0 to 22.0 feet. Underlying the Morgantown sandstone are a series of nearly impermeable shales.

Surface materials at the dam site consist of recent alluvium (confined to the floodplain which is about 370 feet in width at the centerline) and colluvium, which occurs near the bottom of the right abutment. The alluvium at the site is generally composed of silty clays, clayey silts, clayey sands and silty and clayey sand and gravel. Permeability tests performed in the alluvium indicate flow rates of near zero to 3.7×10^{-4} cm/sec in one drill hole at a depth of 6.0 to 7.5 feet.

Topsoil on the abutments and in the floodplain ranged from about 0.4 to 1.0 feet in thickness and averaged about 0.5 feet.

Water levels in the abutments approximately parallel the ground surface and range from 13 feet near the bottom of the right abutment to 32 feet on the right abutment.

*Portions of this section have been taken from the "Detailed Geologic Investigation of Dam Sites" as prepared by the Soil Conservation Service for Site Number PA-656, January, 1971.

APPENDIX F

FIGURES

SUBJECT GREENLICK RUN DAM

BY SRM DATE 10-16-78

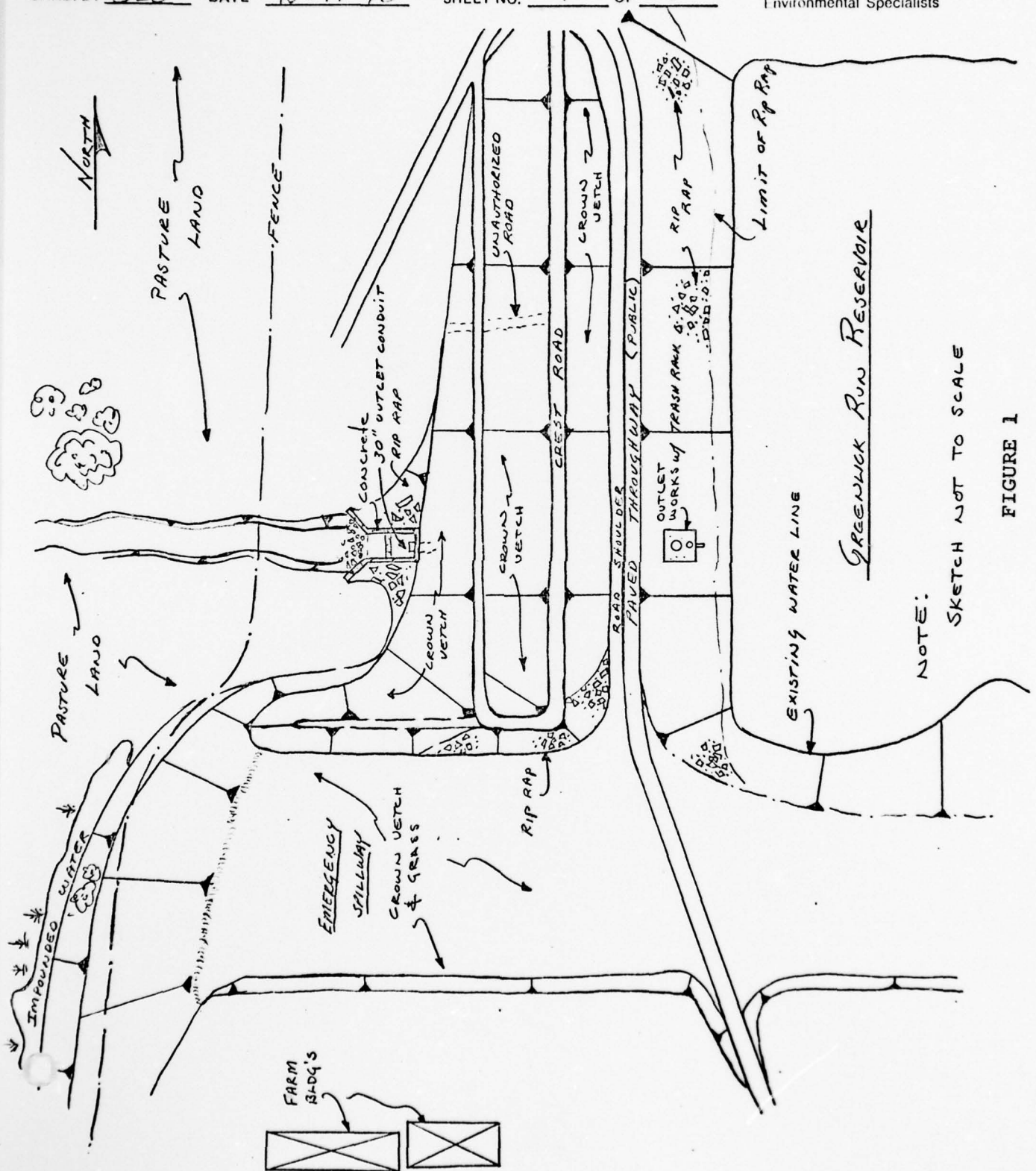
PROJ. NO. 78-501-355

CHKD. BY DLB DATE 10-17-78

SHEET NO. 1 OF 1

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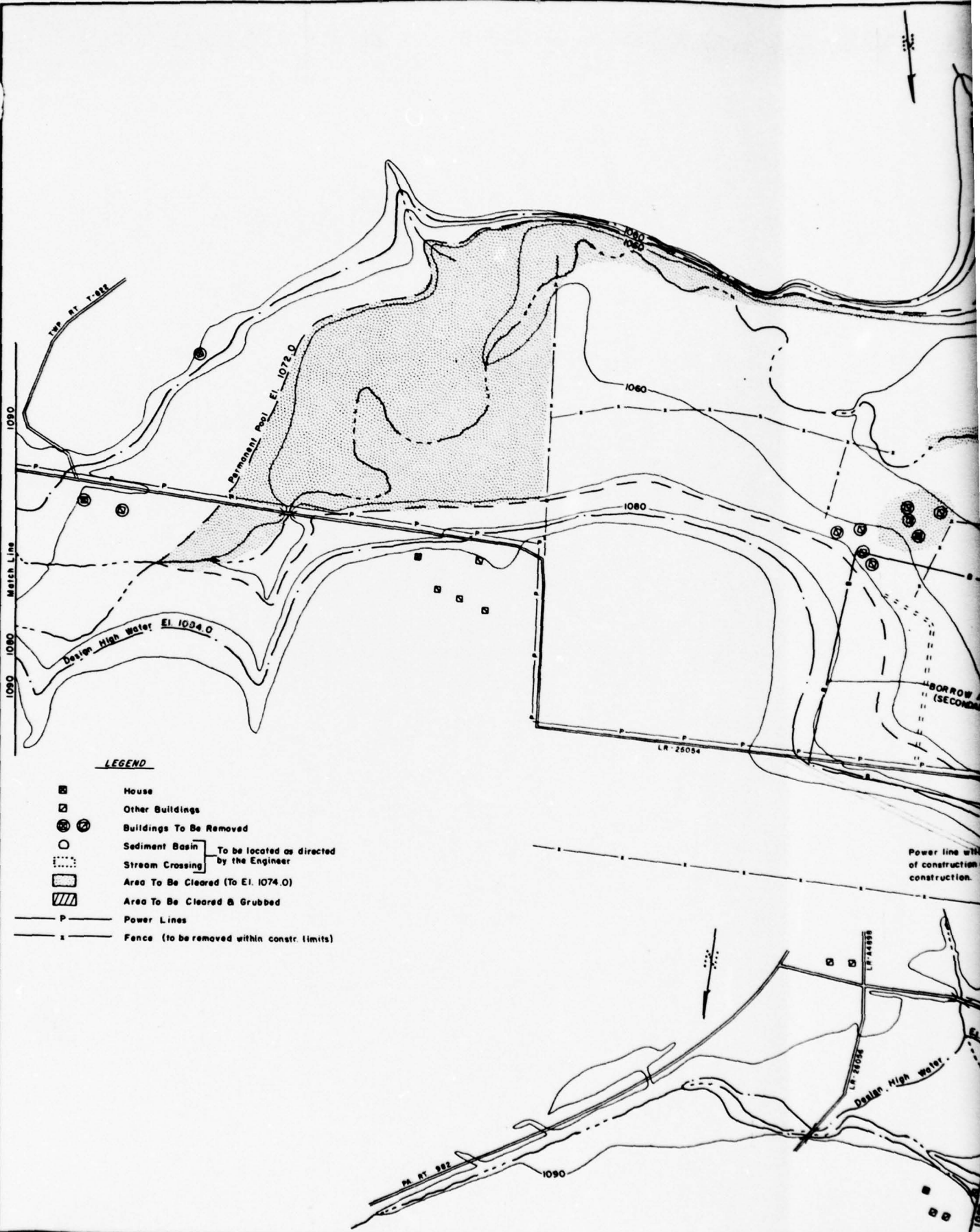
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NOTE:

SKETCH NOT TO SCALE

FIGURE 1



LEGEND

- House
- Other Buildings
- Buildings To Be Removed
- Sediment Basin
- Stream Crossing
- Area To Be Cleared (To El. 1074.0)
- Area To Be Cleared & Grubbed
- Power Lines
- Fence (to be removed within constr. limits)

Power line with
of construction
construction.

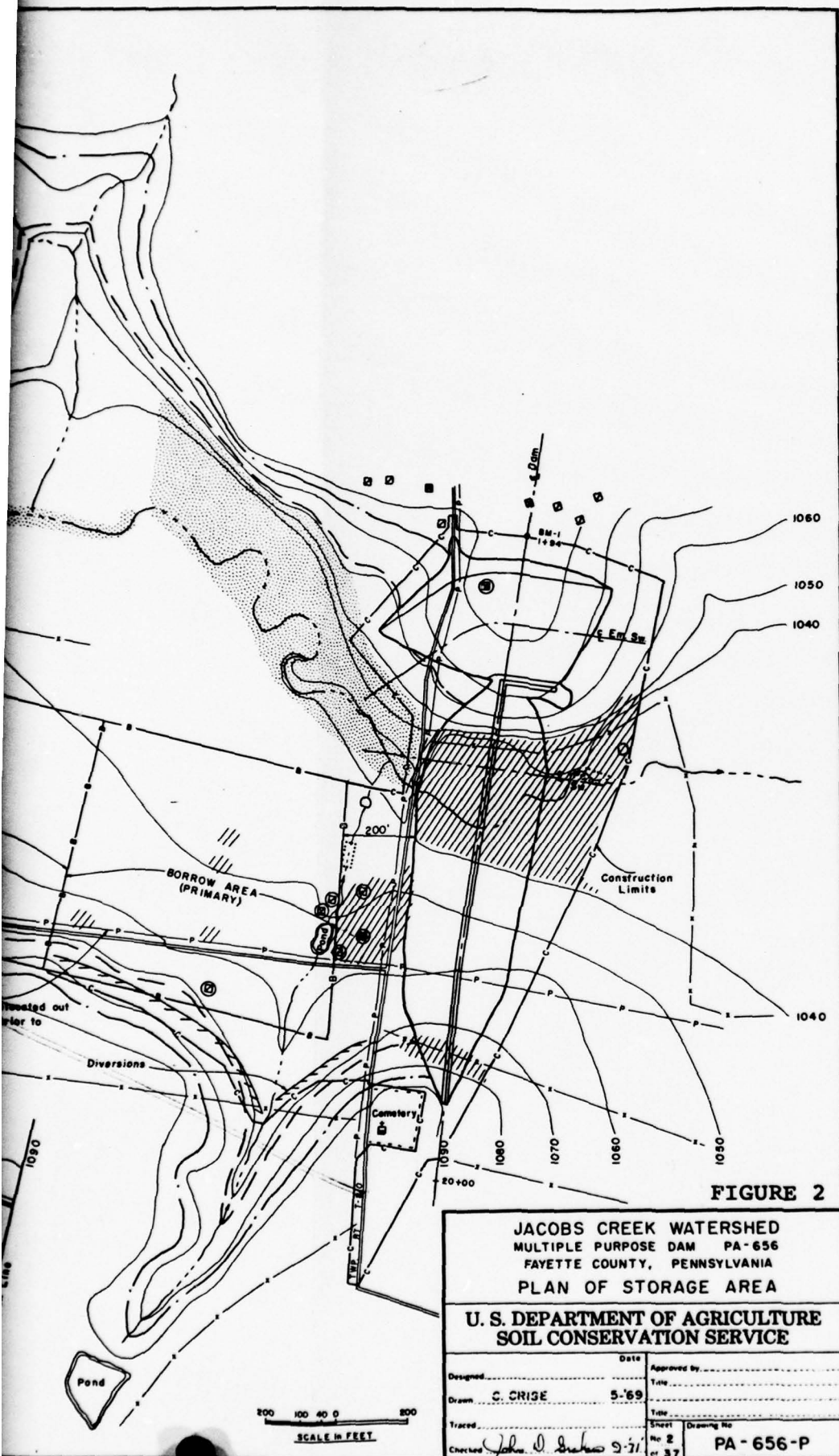
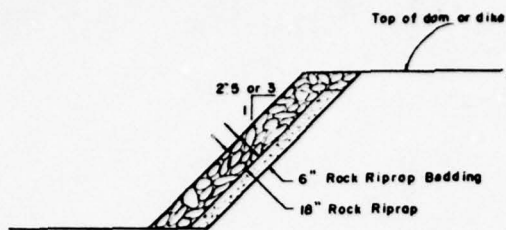


FIGURE 2

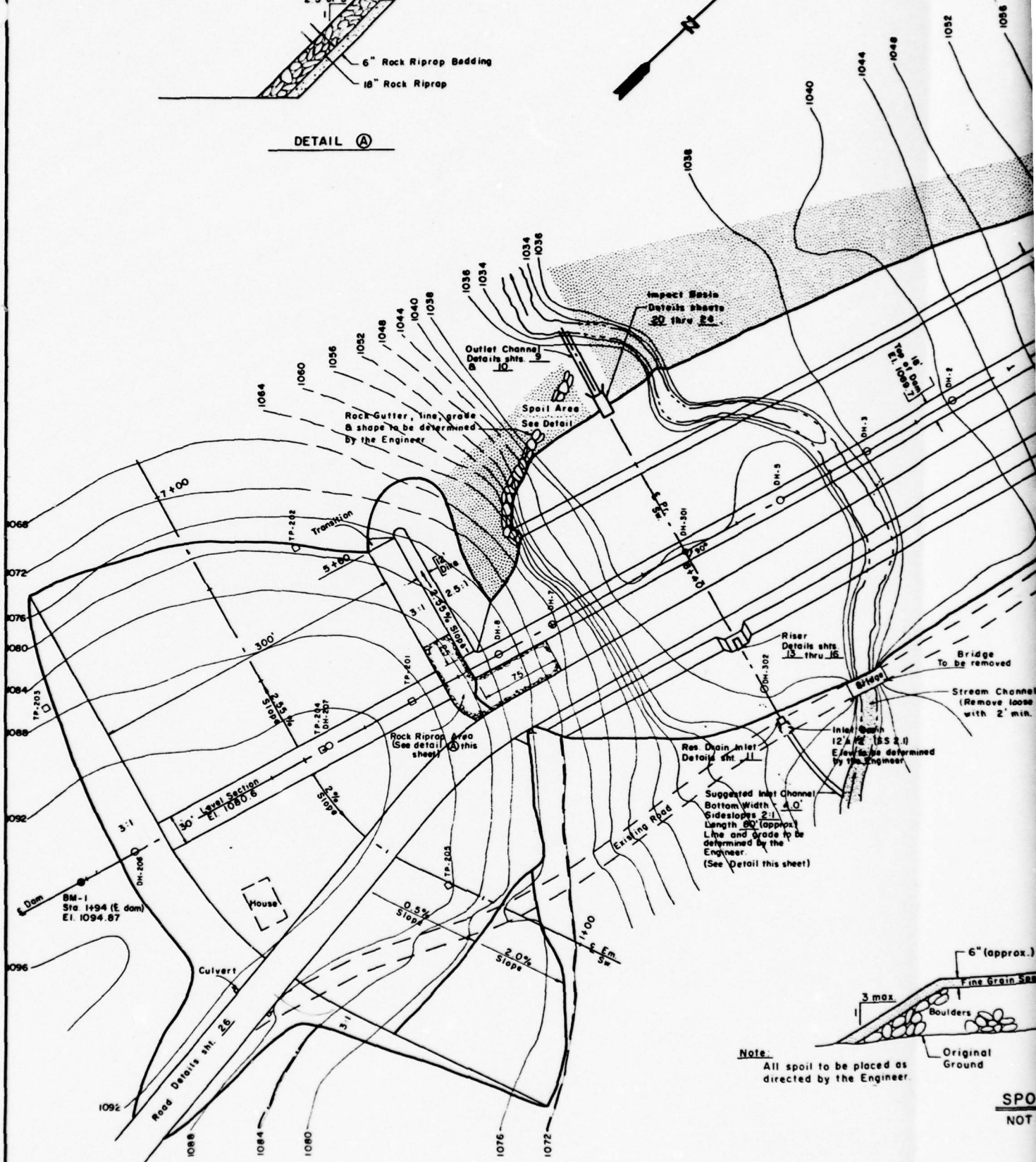
JACOBS CREEK WATERSHED
MULTIPLE PURPOSE DAM PA-656
FAYETTE COUNTY, PENNSYLVANIA
PLAN OF STORAGE AREA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by
Drawn C. CRISE	5-69	Title
Traced	Sheet	Drawing No
Checked	No 2	PA-656-P
	of 37	



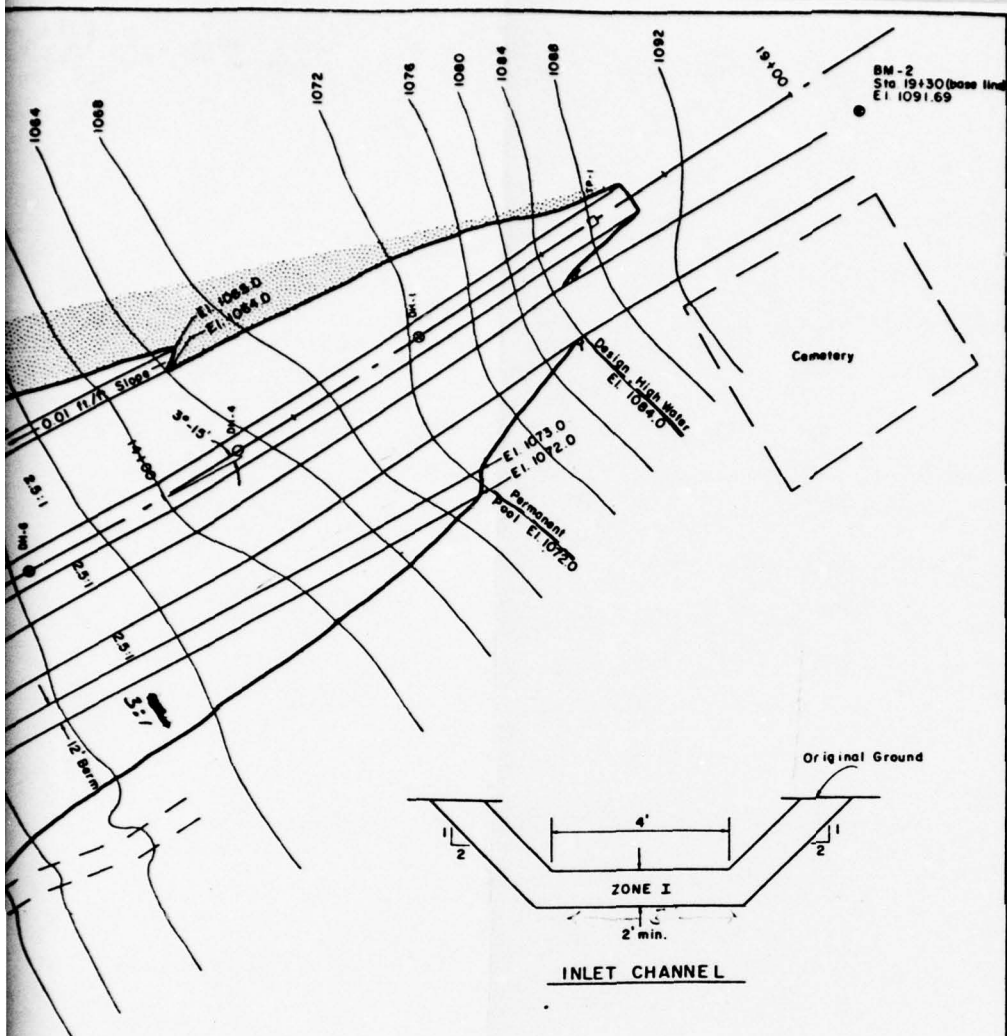
DETAIL A



Note

All spoil to be placed as directed by the Engineer.

SPO
NOT



Notes

1. For layout data see sht. 5.
2. For logs of test holes see shts. 33 thru 36.
3. For foundation excavation details see sht. 7.
4. For rock surface treatment details see sht. 7.
5. Repair existing natural blanket for a distance of 200' U.S. from toe of dam and on sw. entrance channel to el. 1090 (a min. of 2' natural fine grained material or 2' of Zone I material will be required.)

60 30 15 0 60
SCALE in FEET

FIGURE 3

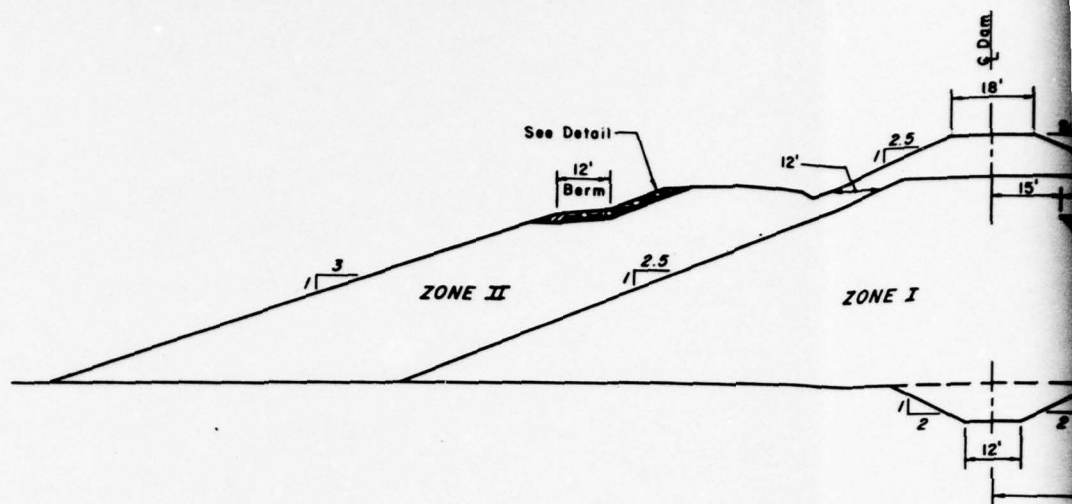
JACOBS CREEK WATERSHED MULTIPLE PURPOSE DAM PA-656 FAYETTE COUNTY, PENNSYLVANIA PLAN OF STRUCTURAL WORKS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Project	Date	File No.
CRISE	9-71	
Drawn by	Checked	37
	9-71	
PA-656-P		

SEE ATTACHED PAGES

2

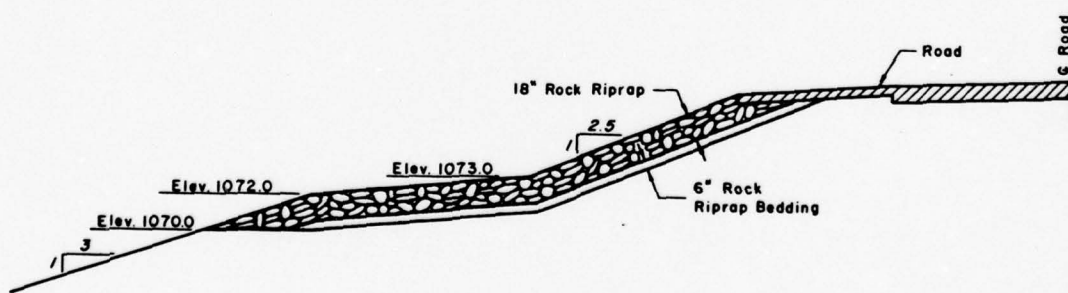


TYPICAL SECTION

0 5 10 20
SCALE

CONSTRUCTION NOTES

1. Constructed Slopes are:
 2.43:1 Downstream
 2.43:1 Upstream
 2.94:1 Upstream
2. For constructed fill elevations
 see sheet 1.



ROCK RIPRAP DETAILS

0 5 10 FEET
SCALE

SELECTION
PLACE

ZONE

ZONE

ZONE

11

12

13

14

NO

6'

9'

11'

13'

15'

17'

19'

21'

23'

25'

27'

29'

31'

33'

35'

37'

39'

41'

43'

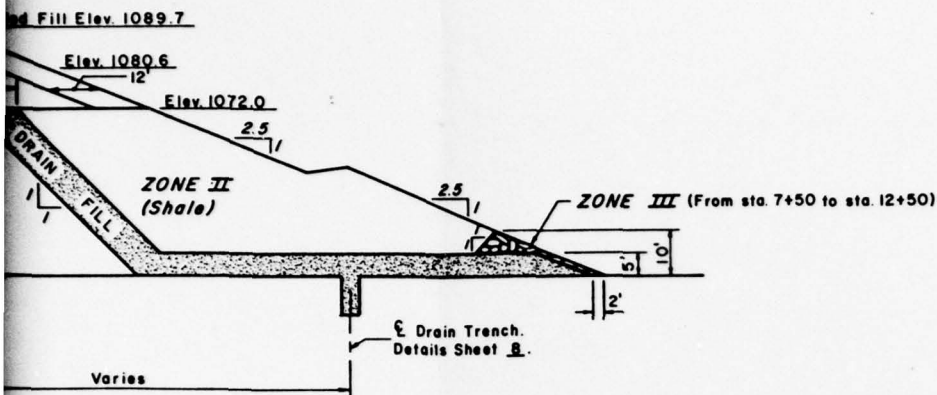
45'

47'

49'

51'

53'



OF DAM

FEET

ZONE	MATERIAL	MAX. ROCK SIZE	MAX. LIFT	REQ'D. WATER CONTENT	COMPACTION	
					CLASS	DEFINITION
I	Material as represented by Lab. samples 71W1337 and 71W1338, classified as CH and CL respectively.	6"	9"	Optimum +2%	A	95% Max. density by ASTM D-698, Method "A".
II	Material as represented by Lab. samples 71W1339 and 71W1340, classified as GC and Shale respectively.	6"	9"	Optimum -2% to +2%	A	95% Max. density by ASTM D-698, Method "D".
	Material as represented by Lab. sample 71W1338, classified as CL.	6"	9"	Optimum +2%	A	95% Max. density by ASTM D-698, Method "A".
III	Material excavated from left abutment or oversized material raked from Zones I and II.	12"	18"	None	C	Min. 6 passes with 450 psi tamping roller.

Maximum permissible lift thickness before compaction.

Water content of fill matrix at time of compaction. Variation from water content shown may be approved by the Engineer.

For typical compaction curves, see sheet 37.

CH to be selectively placed against the steep left abutment.

E

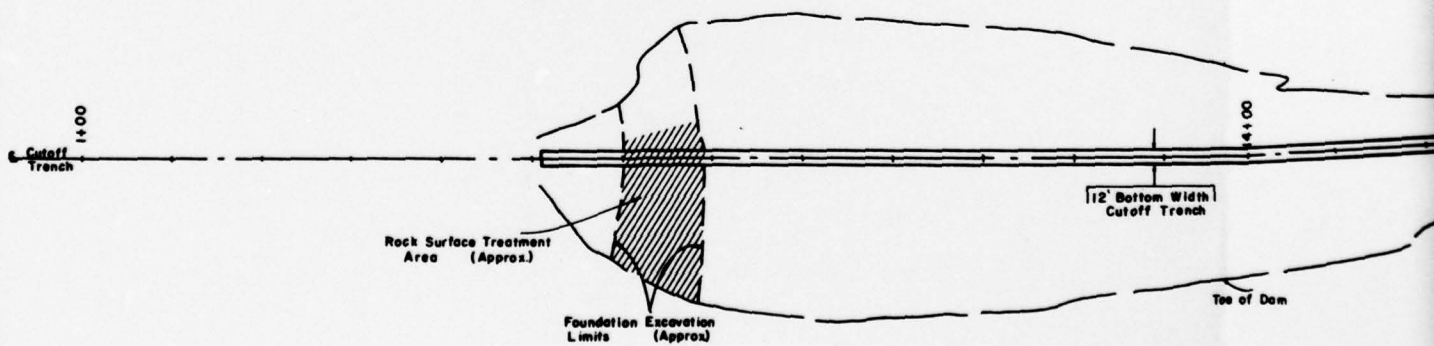
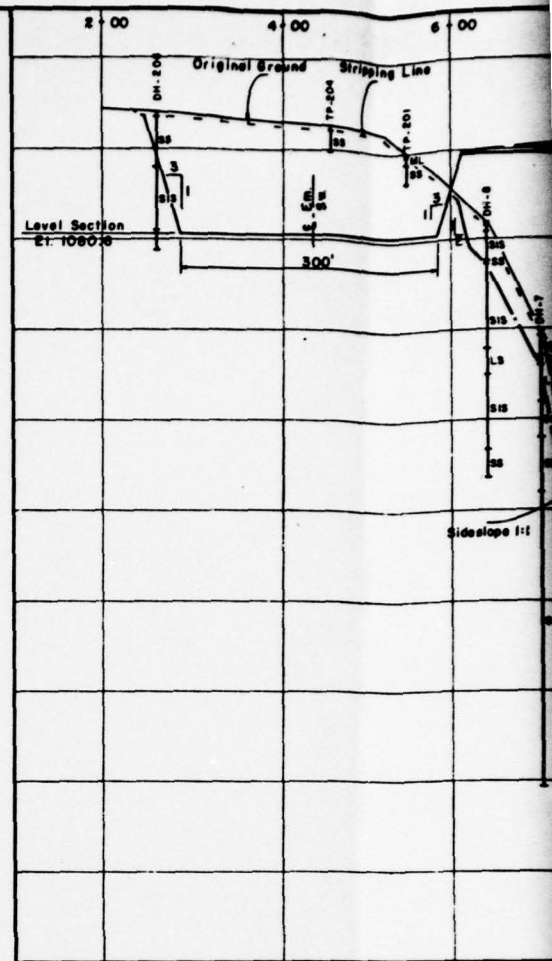
Backfill in the Emergency Spillway bottom shall be fine in material. Source and moisture content as approved by Engineer. Compact by a minimum of 4 passes of hauling equipment or equivalent. (Bid Item 7)

FIGURE 4

JACOBS CREEK WATERSHED MULTIPLE PURPOSE DAM PA-656 FAYETTE COUNTY, PENNSYLVANIA FILL PLACEMENT			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	Date	Approved by	Title
Drawn R A STALTER	10-71		
Traced	Checked	Sheet	Drawing No.
	10-71	4	PA-656-P
		37	

ROCK SURFACE TREATMENT NOTES

1. ENTIRE ROCK SURFACE TREATMENT AREA UNDER EMBANKMENT TO BE CLEANED AND WASHED.
2. PREPARATION, CLEANING AND ROCK SURFACE TREATMENT SHALL BE ACCOMPLISHED IN ACCORDANCE WITH SPEC. 216.
3. ROCK SURFACE TREATMENT TO BE PLACED AS DIRECTED BY THE ENGINEER.



PLAN VIEW
100 50 25 0 100
SCALE IN FEET

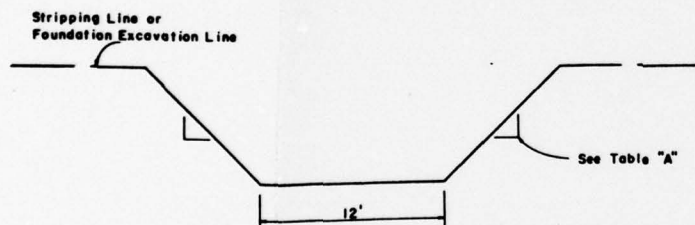
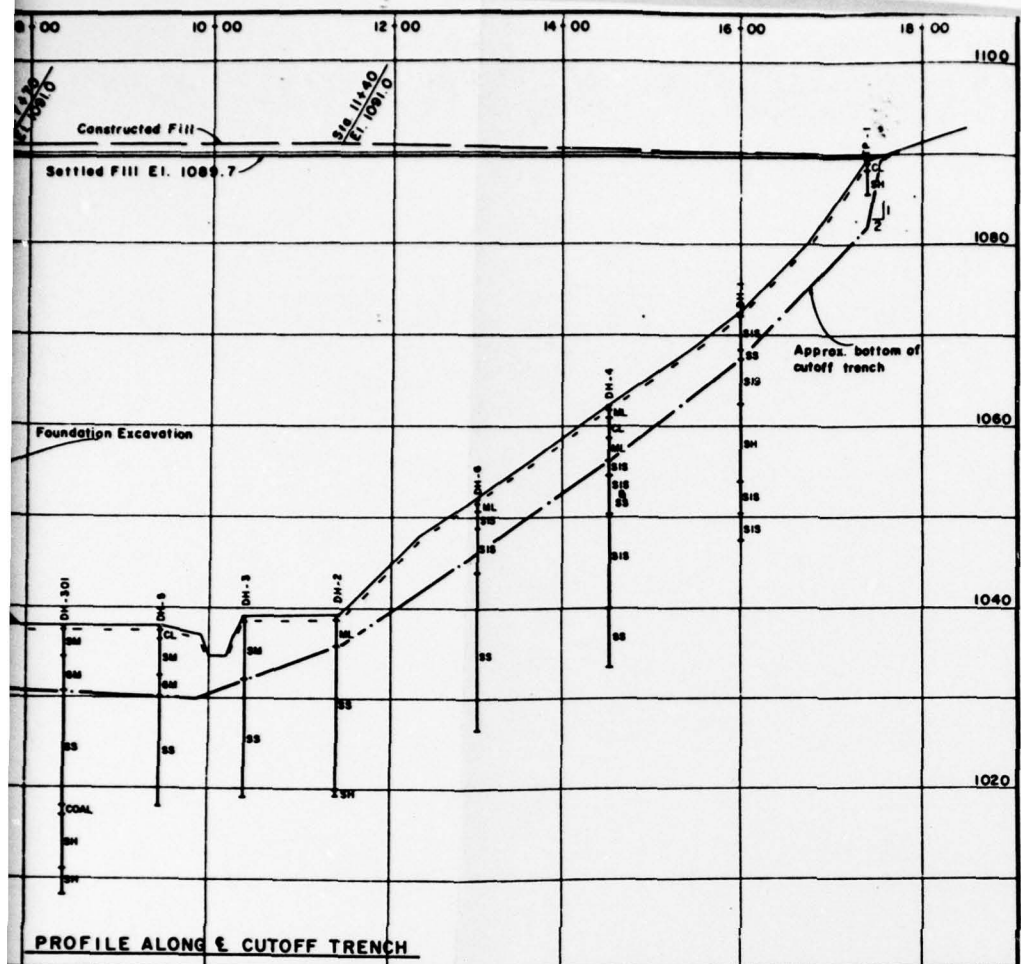


TABLE "A"

SIDESLOPES	STATIONS
2:1	6+10 to 6+88
Transition	6+88 to 7+08
1:1	7+08 to 7+70
Transition	7+70 to 7+90
2:1	7+90 to 17+85

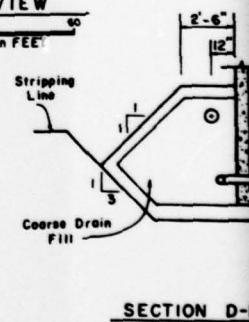
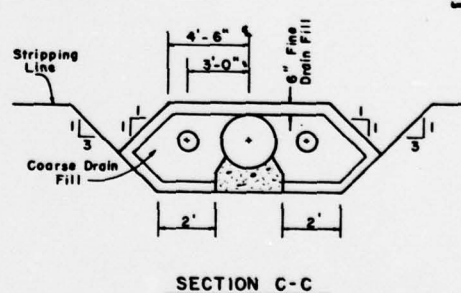
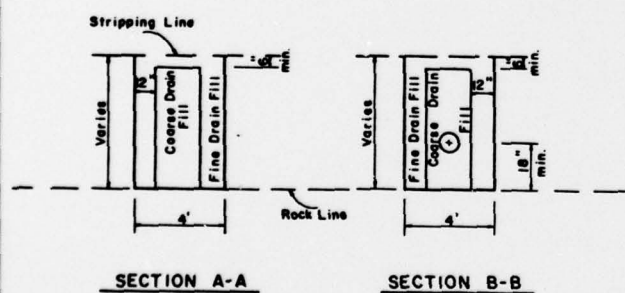
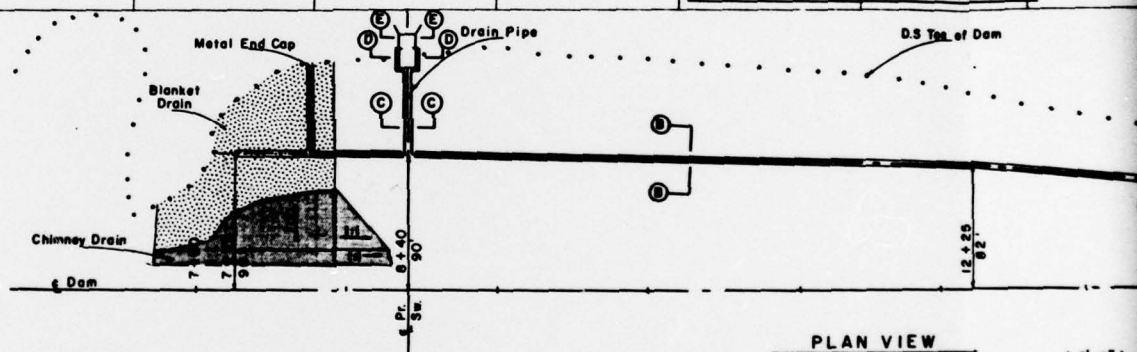
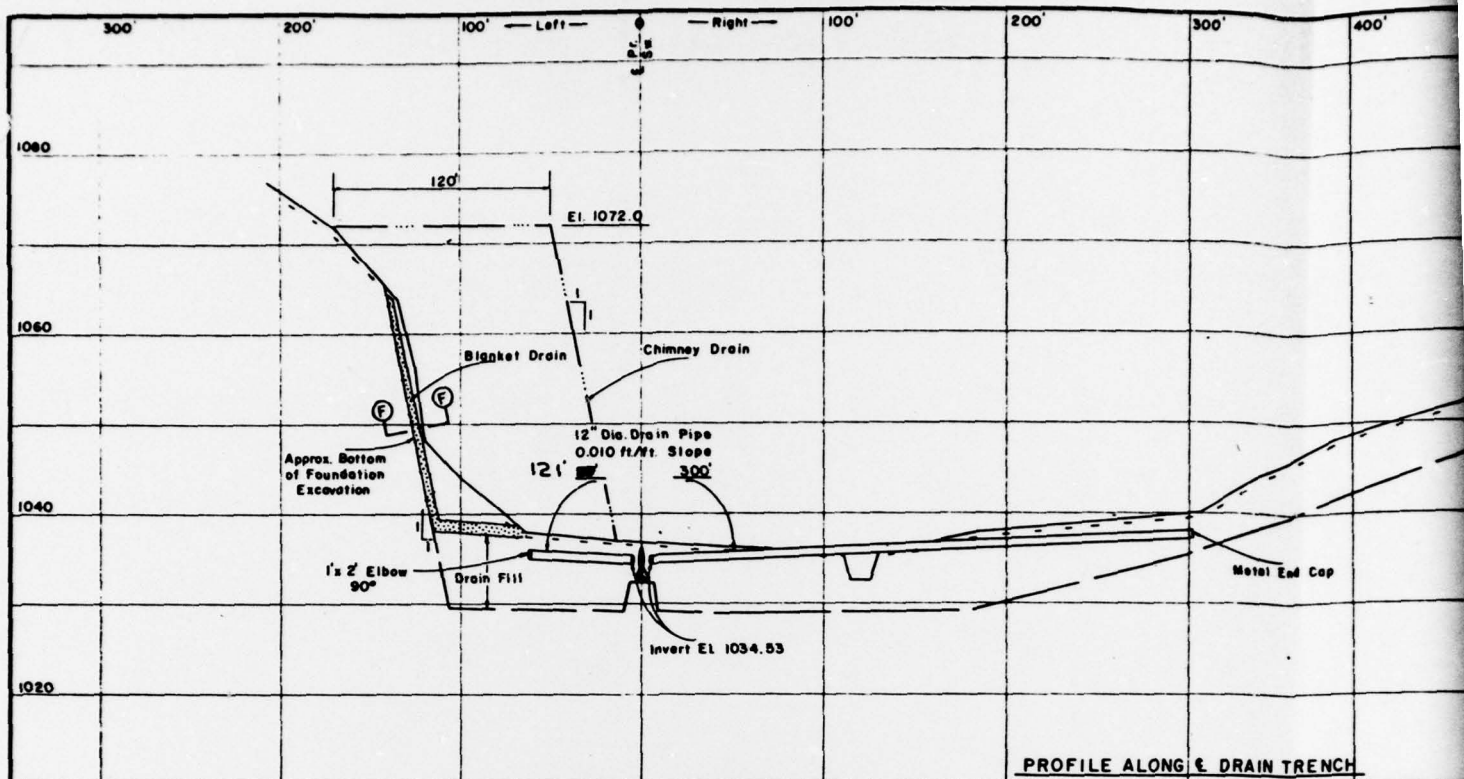
TYPICAL SECTION CUTOFF TRENCH

FIGURE 5

CONSTRUCTION NOTES

1. C. Dam = C. Cutoff Trench
2. For logs of test holes see shts. 33 thru 36.

JACOBS CREEK WATERSHED MULTIPLE PURPOSE DAM PA - 656 FAYETTE COUNTY, PENNSYLVANIA CUTOFF TRENCH			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	Date	Approved by	Title
Drawn	CRISE 9-71		
Traced		Sheet	Drawing No.
Checked	9-71	no. 7 of 37	PA-656-P



CONSTRUCTION NOTE

All drain pipe shall be 12" dia., Class I, & II
Shape 1, Coating 16 Gage, Perforated.
Spec. 551.

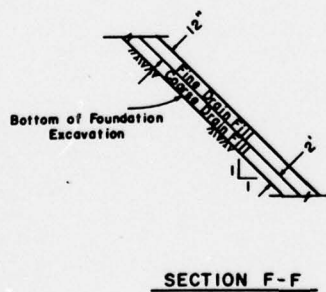
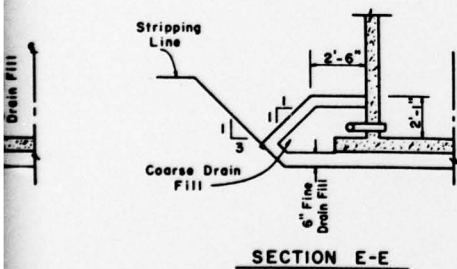
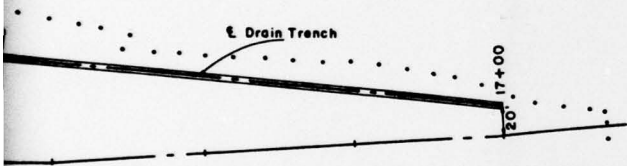
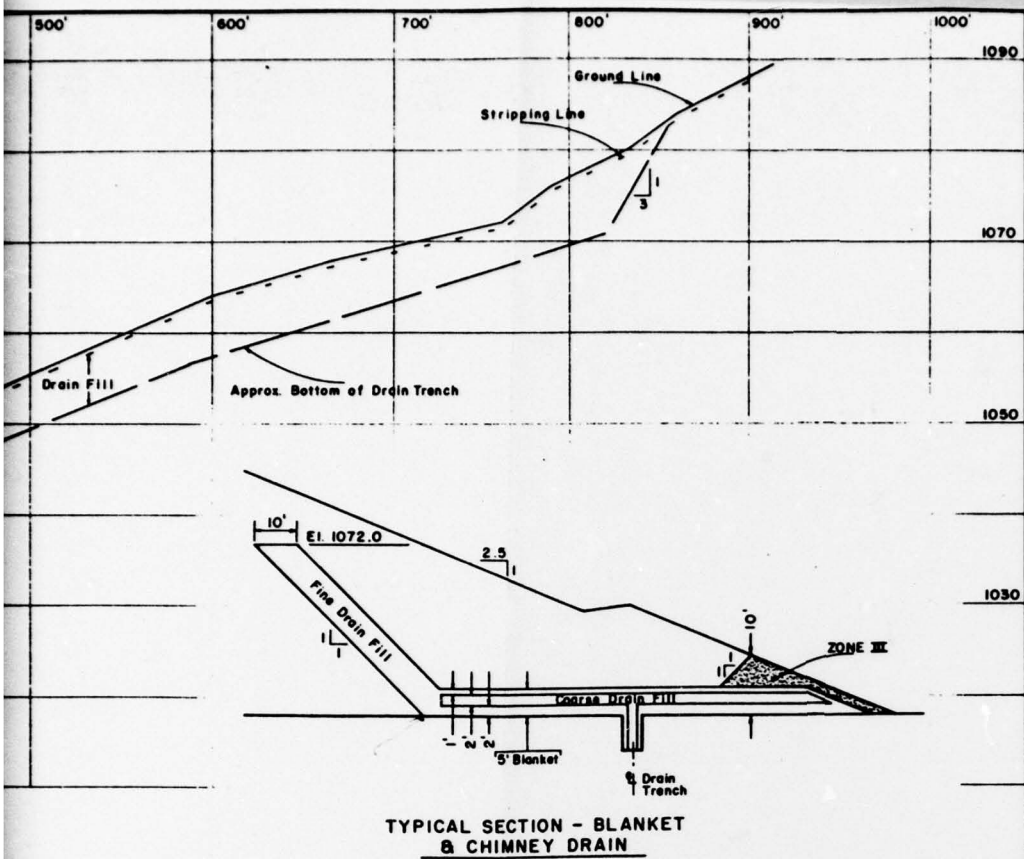
A or G

QUANTITY SUMMARY

3	-	8' Sections
3	-	10' Sections
24	-	20' Sections
3	-	1' x 2' Elbows, 90°
2	-	1'-6" x 1'-9" Elbows, 90°
2	-	1'-3" x 2'-3" Elbows, 90°
2	-	1'-0" x 2'-6" Elbows, 90°
2	-	Metal End Caps
2	-	Small Animal Guards (Sht. 30)
563'-6"	-	Total

GRADAT

SIEVE NO.	5' PAIL ON 5'
3/8"	
NO. 4	90
NO. 8	70
NO. 16	50
NO. 30	30
NO. 50	10
NO. 100	3
NO. 200	-



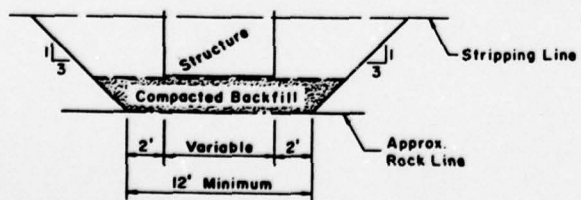
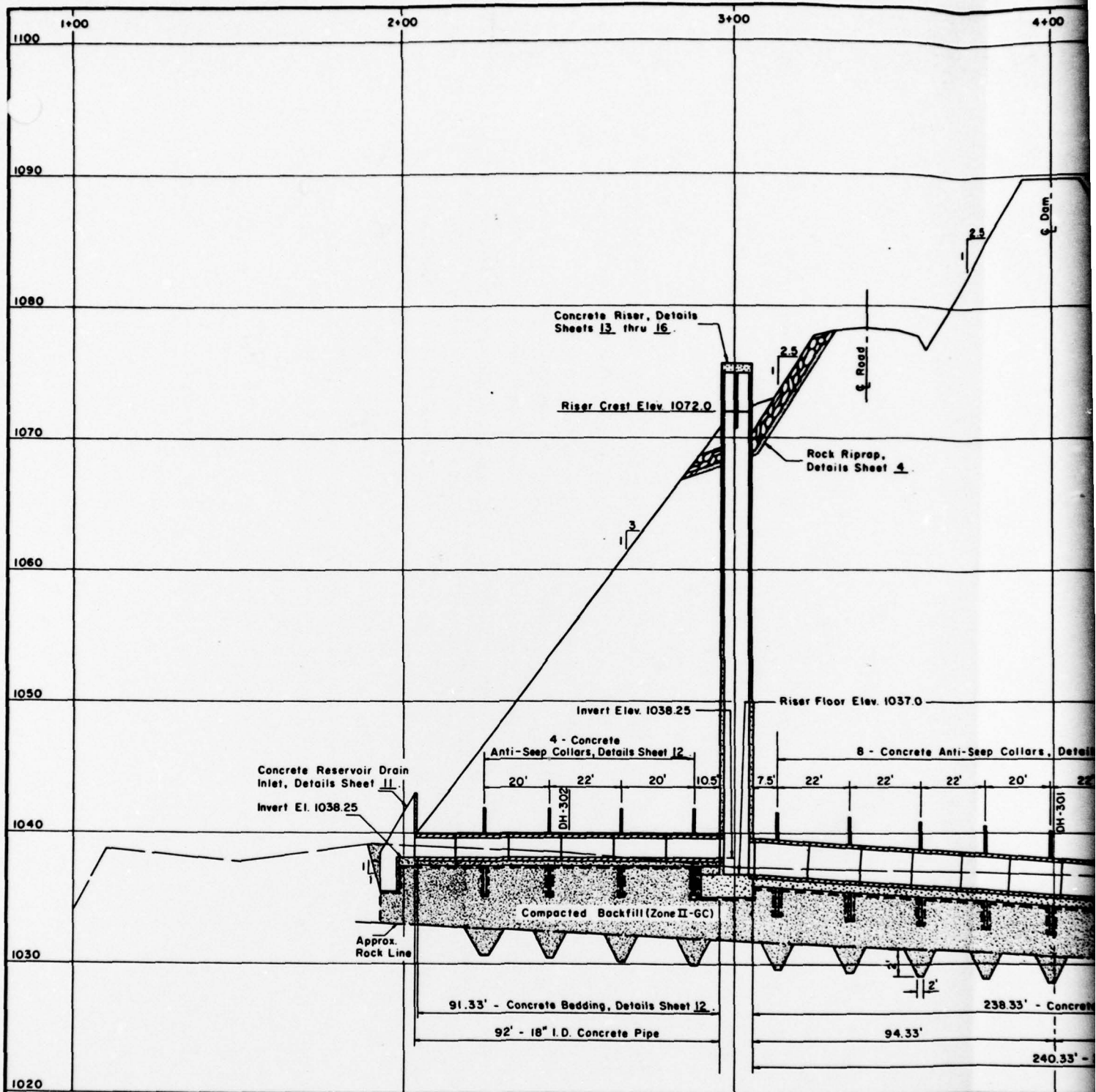
LIMITS FOR DRAIN FILL

COARSE DRAIN FILL	
SIEVE NO.	% PASSING (BASED ON DRY WEIGHT)
1"	100
1 1/2"	90 - 100
3/8"	40 - 75
NO. 4	0 - 25
NO. 6	0 - 10
NO. 200	< 3

FIGURE 6

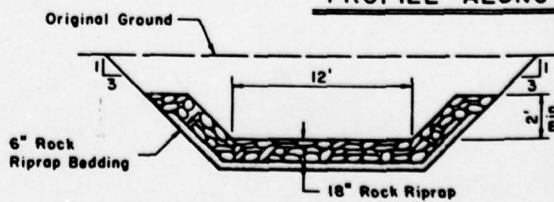
JACOBS CREEK WATERSHED MULTIPLE PURPOSE DAM PA-656 FAYETTE COUNTY, PENNSYLVANIA DRAINAGE			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
Designed	Date	Approved by	Title
Drawn	CRISE	9-71	
Traced			
Checked	John D. Smith	9-71	
Sheet No. 8 of 37		Drawing No. PA-656-P	

SCS-313B (APRIL 1963)



PRINCIPAL SPILLWAY

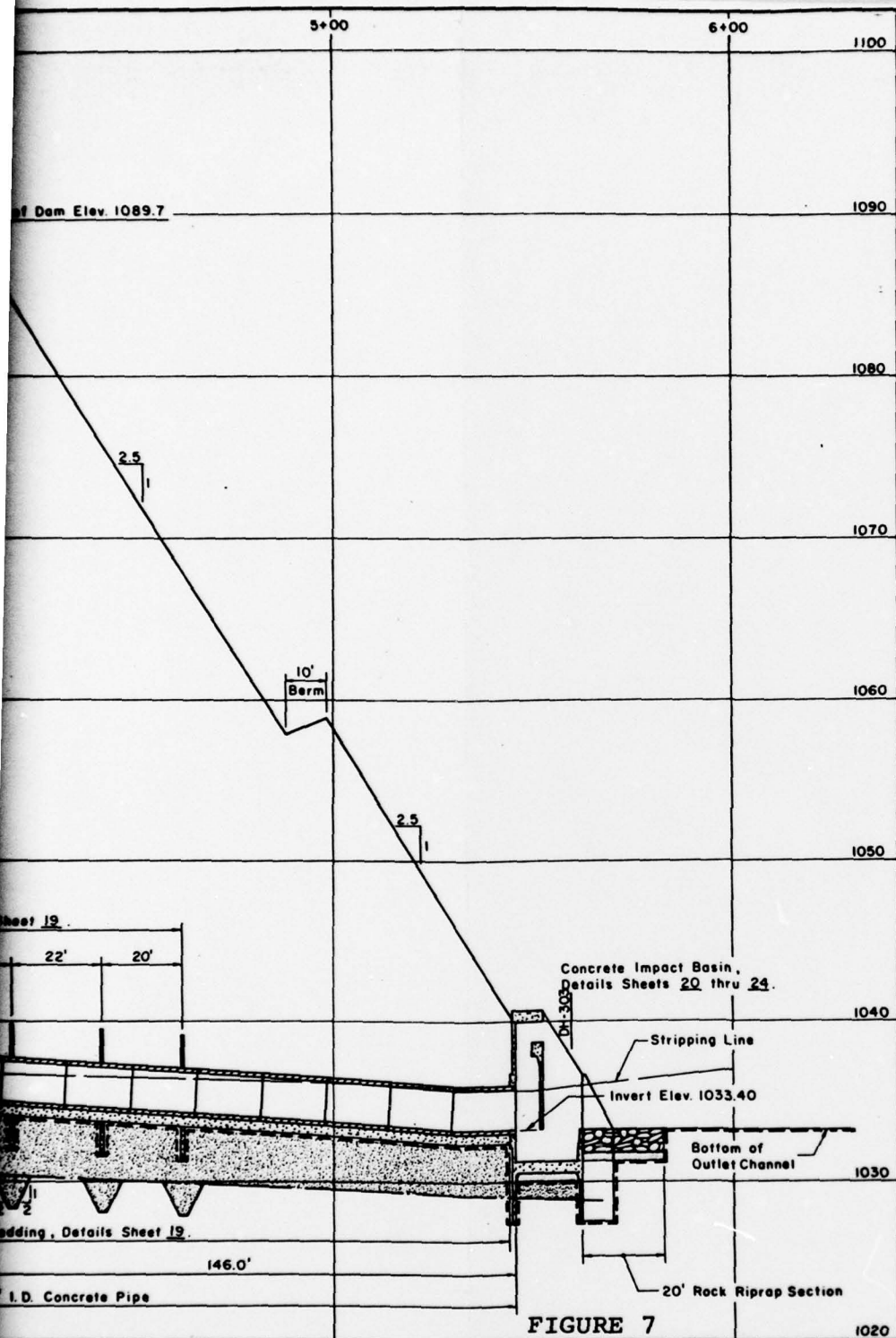
From Sta. 2+05 to
Sta. 5+70 (Approx.)



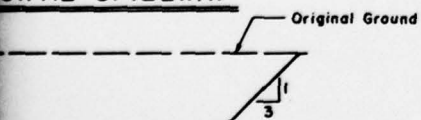
OUTLET CHANNEL

20' Rock Riprap Section

PROFILE ALONG CENTERLINE PR



PRINCIPAL SPILLWAY



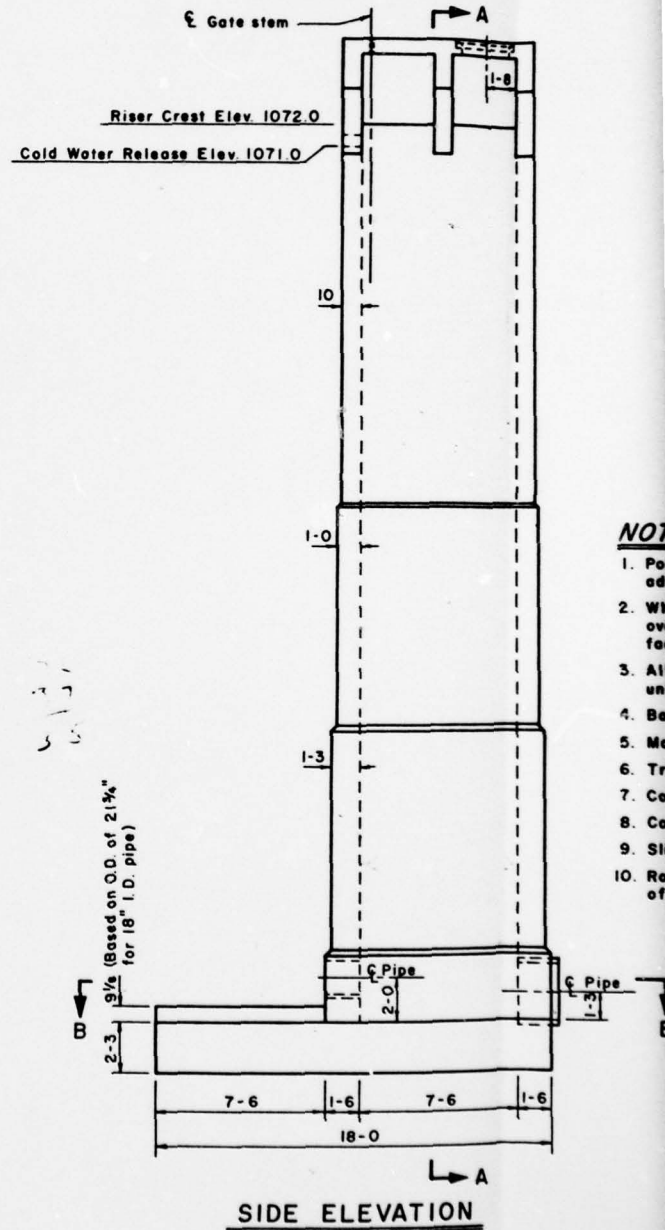
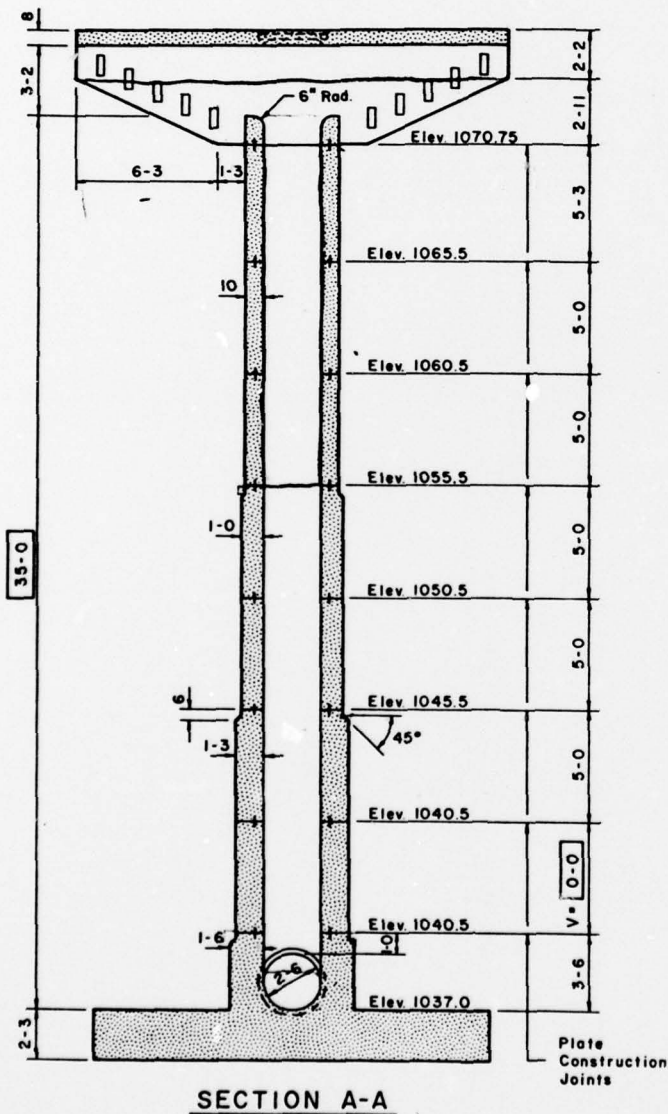
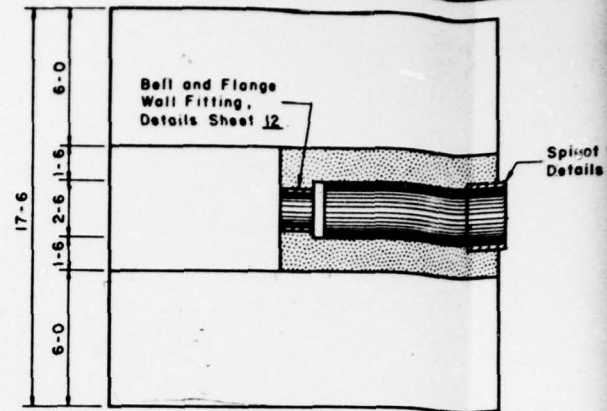
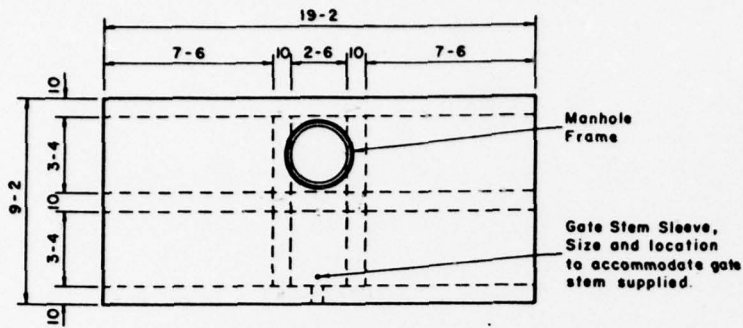
OUTLET CHANNEL

and grade to be determined by the Engineer

JACOBS CREEK WATERSHED MULTIPLE PURPOSE DAM PA-656 FAYETTE COUNTY, PENNSYLVANIA PRINCIPAL SPILLWAY EXCAVATION

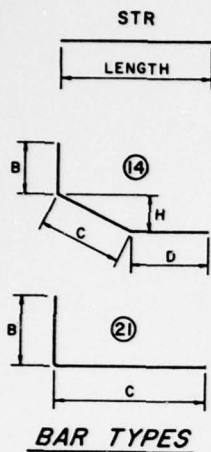
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	Date	Approved by	Title
Drawn R. A. STALTER	9-71		
Traced			
Checked	9-71		
		Sheet No. 10 of 37	Drawing No. PA-656-P



- NOT
1. Po
 2. Wl
 3. Al
 4. Be
 5. Me
 6. Tr
 7. Co
 8. Co
 9. Sh
 10. Re

Setting,
19.



QUANTITIES (Riser Only)

STEEL

No. 5 Bars 4640.3 Ft. = 4839.8 Lbs.
 No. 6 Bars 1662.0 Ft. = 2496.3 Lbs.
 No. 7 Bars 1389.4 Ft. = 2839.9 Lbs.
 No. 8 Bars 1118.0 Ft. = 2985.1 Lbs.
 13161.1 Lbs.

CONCRETE

Class 4000 71.7 Cu. Yds. Reinforced

Cement type I-A or I with an air-entraining
 shall be used

Otherwise shown, thickness of concrete
 reinforcing steel shall be 2" in formed sur-
 and 3" in unformed surfaces.

Edges of concrete to have a 1" chamfer
 otherwise noted.

Dimensions are out to out of bar

cover and frame details sheet 30.

Back details sheet 17.

For release details sheet 18.

Section joint details sheet 14.

See notes sheet 17.

Bottom of riser to stop 6" from inside
 beam endwall.

RISER STEEL SCHEDULE

MARK	SIZE	QUANTITY	LENGTH	TYPE	B	C	D	H	TOTAL LENGTH
B 1	7	24	17-0	STR					408-0
B 2	8	41	10-0	STR					410-0
B 3	6	18	9-9	STR					175-6
B 4	8	40	8-6	21	3-8	4-10			340-0
B 5	6	18	17-6	STR					315-0
B 6	6	13	17-0	STR					221-0
B 7	8	14	17-0	STR					233-0
B 8	6	4	7-9	STR					31-0
B 9	7	7	5-9	21	1-0	4-9			40-3
B 10	7	19	8-6	21	1-0	7-6			161-6
B 11	5	14	8-6	STR					119-0
B 12	6	5	3-6	STR					17-6
B 13	7	3	3-0	STR					9-0
B 14	7	2	3-0	STR					6-0
B 15	8	26	5-0	STR					130-0
B 16	6	10	7-3	21	1-1	6-2			72-6
B 17	6	14	9-9	21	3-7	6-2			136-6
B 18	6	4	9-3	21	3-4	5-11			37-0
B 19	6	8	2-9	STR					22-0
R 1	7	22	7-3	STR					159-6
R 2	5		8-6	STR					
R 3	6		3-6	STR					
R 4	7	28	4-9	STR					133-0
R 5	7		9-6	21	3-6	6-0			
R 6	5	20	8-6	STR					170-0
R 7	6	10	3-6	STR					35-0
R 8	7	26	4-4	STR					112-8
R 9	6	36	9-3	21	3-4	5-11			333-0
R 10	6	4	8-9	21	3-2	5-8			35-0
R 11	5	22	11-9	STR					258-6
R 12	5	20	8-6	STR					170-0
R 13	5	10	3-6	STR					35-0
R 14	5	26	9-6	STR					247-0
R 15	7	40	9-0	21	3-3	5-9			360-0
R 16	6	14	8-3	STR					115-6
R 17	5	10	3-6	STR					35-0
R 18	5	20	3-8	STR					73-4
R 19	5	36	8-3	21	2-10 1/2	5-4 1/2			297-0
R 20	5	4	8-0	21	2-9	5-3			32-0
R 21	5	20	11-9	STR					235-0
R 22	6	14	8-3	STR					115-6
R 23	5	8	3-3	STR					26-0
R 24	5	20	11-9	STR					235-0
R 25	5	80	8-0	21	2-9	5-3			300-0
R 26	5	10	8-3	STR					82-6
R 27	5	8	3-3	STR					26-0
R 28	5	28	8-0	21	2-9	5-3			224-0
R 29	5	8	3-3	STR					26-0
R 30	5	10	8-3	STR					82-6
R 31	5	10	7-0	STR					70-0
R 32	5	28	8-0	21	2-9	5-3			224-0
R 33	5	14	6-2	STR					86-1
R 34	5	14	6-4	STR					88-8
T 1	5	6	7-0	STR					42-0
T 2	5	6	12-6	STR					75-0
T 3	5	6	18-0	STR					108-0
T 4	5	6	18-9	STR					112-6
T 5	5	12	8-6	14	1-9	6-9	0-0	2-10	102-0
T 6	5	12	2-3	STR					27-0
T 7	5	12	3-0	STR					36-0
T 8	5	12	3-6	STR					42-0
T 9	5	12	4-3	STR					51-0
T 10	5	20	4-6	STR					90-0
T 11	5	16	4-9	STR					76-0
T 12	5	6	8-9	STR					52-6
T 13	5	32	8-6	STR					272-0
T 14	5	4	5-0	STR					20-0
T 15	5	12	18-9	STR					225-0
T 16	5	8	7-9	STR					62-0

JACOBS CREEK WATERSHED

MULTIPLE PURPOSE DAM PA-656
 FAYETTE COUNTY, PENNSYLVANIA

RISER STRUCTURAL DETAILS

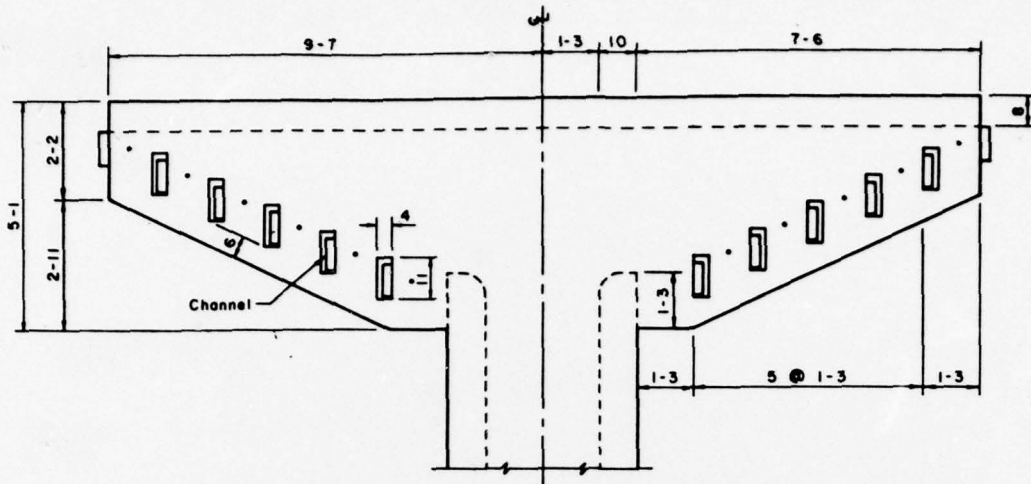
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

Designed	Date	Approved by
Drawn R. A. STALTER	9-71	Title
Traced	Sheet No. 13 of 37	Drawing No. PA-656-P
Checked J. D. [Signature]	9-71	

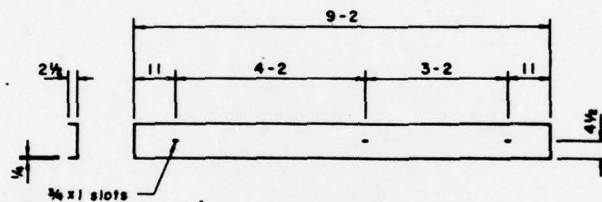
0 1 2 3 4 6 8 FEET
 SCALE

FIGURE 8

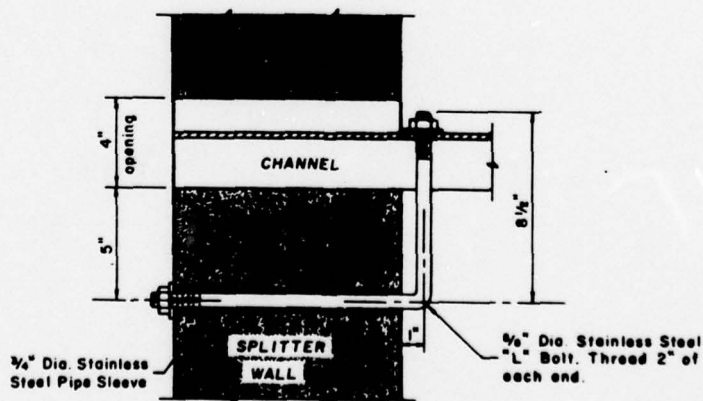
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SPLITTER WALL ELEVATION

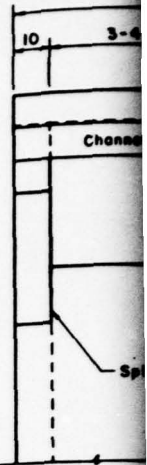


CHANNEL



"L" BOLT DETAIL

SUPPLY WITH HEX NUTS AND
FLAT WASHERS ASTM A-276



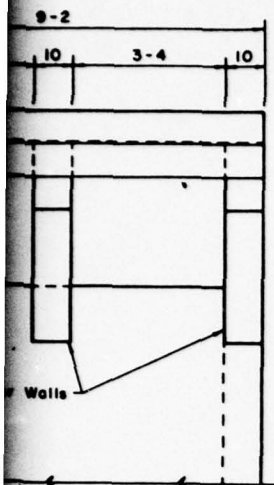
ENDW

BILL	
ITEM	
Channel	
Pipe Sleeve	
"L" Bolt	

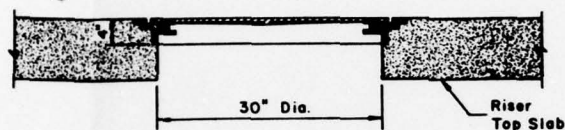
CONSTRUCTION

1. Channel in Spec. 581
2. Aluminum with concrete of on site before install

RISER, TRANS



ELEVATION



MANHOLE ASSEMBLY

1. THE ASSEMBLY SHALL BE GREY IRON CASTING, CLASS 30, WITH A 30" OPENING.
2. THE LIFTING DEVICE SHALL CONSIST OF A 1" DIA. HOLE APPROX. 3" FROM THE OUTSIDE PERIMETER OF THE LID.
3. THE LOCKING DEVICE SHALL CONSIST OF TWO ROTATING BARS WITH HEX BOLTS LOCATED UNDER OPPOSITE EDGES OF THE LID.
4. PAINT IN ACCORDANCE WITH PAINT SYSTEM A.(SPEC. 82)

MATERIAL		
SIZE	LENGTH	QUANTITY
1/2"	9'-2"	12
1/2" Dia.	0'-10"	36
1/2" Dia.	8 1/2"x12"	36

ON NOTES

ch rack shall conform to aluminum alloy.
 ees to be placed in contact
 shall be given a heavy coat
 sistent bituminous paint
 tion. (Military Spec. MIL-P-6883A)

SLIDE GATE NOTES

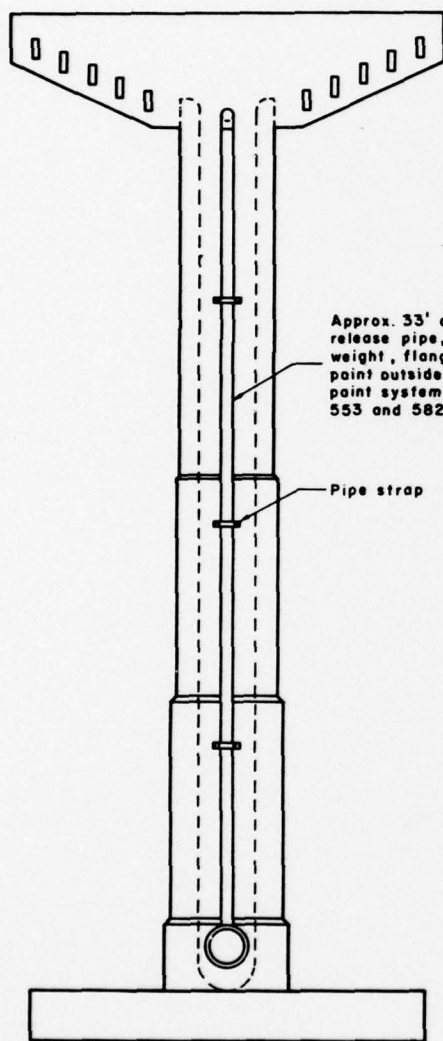
1. SLIDE GATE, 18" DIA., TYPE HMS-2, MATERIAL SPEC. 572.
2. CLASS 10-40, FLAT BACK FRAME.
3. BELL AND FLANGE WALL FITTING, 18" DEEP, ROUND OPENING, DRILL AND TAP TO ACCOMMODATE GATE.
4. FULLY ADJUSTABLE STEM GUIDES.
5. NON-RISING STAINLESS STEEL STEM. STEM GUIDES AND GATE LIFTING DEVICE SIZED AND SPACED ACCORDING TO MANUFACTURERS RECOMMENDATIONS.
6. PAINT IN ACCORDANCE WITH PAINT SYSTEM A, (SPEC. 82).
7. DISTANCE FROM CENTERLINE OF GATE TO TOP OF RISER COVER SLAB = 36' - 10".

FIGURE 9

JACOBS CREEK WATERSHED			
MULTIPLE PURPOSE DAM PA-656			
FAYETTE COUNTY, PENNSYLVANIA			
RISER ACCESSORIES			
U. S. DEPARTMENT OF AGRICULTURE			
SOIL CONSERVATION SERVICE			
Designed	Date	Approved by	Title
Drawn R. A. STALTER	8-71		
Traced	Sheet	Drawing No.	
Checked John H. [Signature]	9-71	No 17 of 37	PA-656-P

SCS-313B (APRIL 1963)

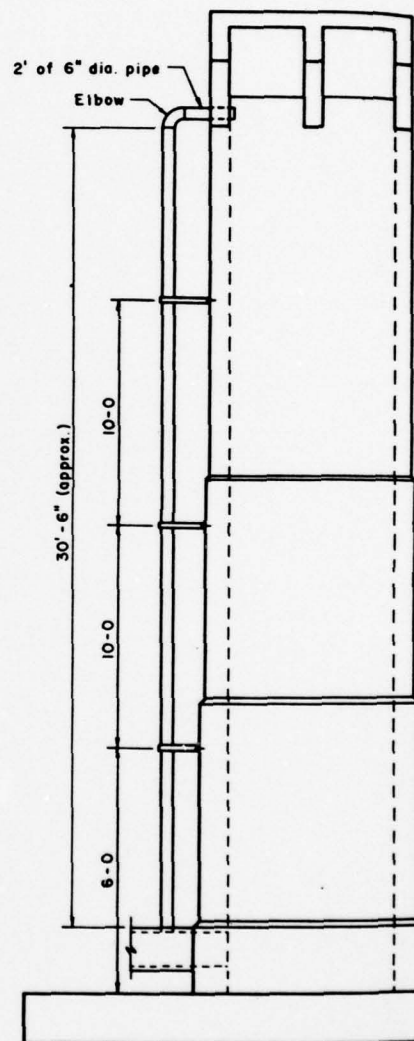
RACK



Approx. 33' of 6" dia. cold water release pipe, galvanized, standard weight, flanged couplings and fittings, paint outside in accordance with paint system G - Spec. 82, Specs. 553 and 582 apply.

Pipe strap

UPSTREAM ELEVATION



2' of 6" dia. pipe

Elbow

30'-6" (approx.)

10'-0"

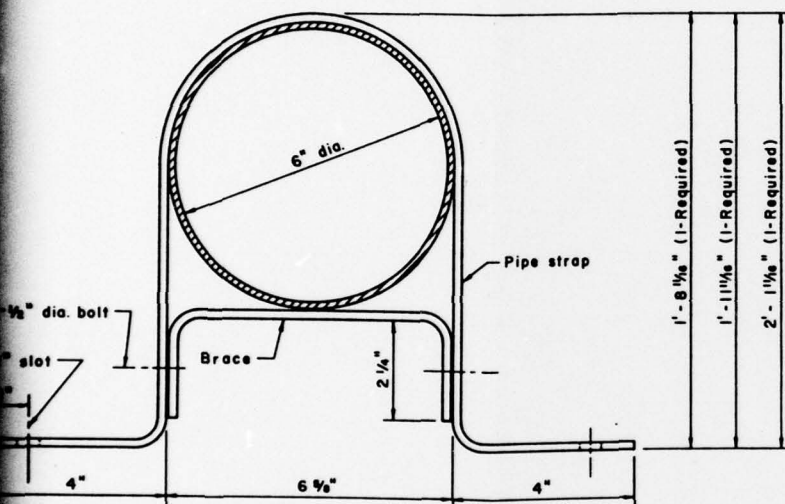
10'-0"

6'-0"

SIDE ELEVATION

PIPE

1. Pipe st
conform
2. All bes
3. Straps
in acc
with p
4. Pipe st



STRAP DETAIL

STRAP NOTES

1. Pipes and braces are $\frac{3}{8}$ " x 3" and shall conform with Spec. 581 for structural carbon steel plates.
2. All corners are $\frac{1}{2}$ " radius.
3. Pipes, bolts, nuts and washers to be galvanized in accordance with Spec. 582, and painted in accordance with system G - Spec. 82.
4. Pipes to be fastened to riser by $\frac{1}{2}$ " dia. expansion bolts.

NOT TO SCALE **FIGURE 10**

JACOBS CREEK WATERSHED
MULTIPLE PURPOSE DAM PA-656
FAYETTE COUNTY, PENNSYLVANIA
COLD WATER RELEASE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

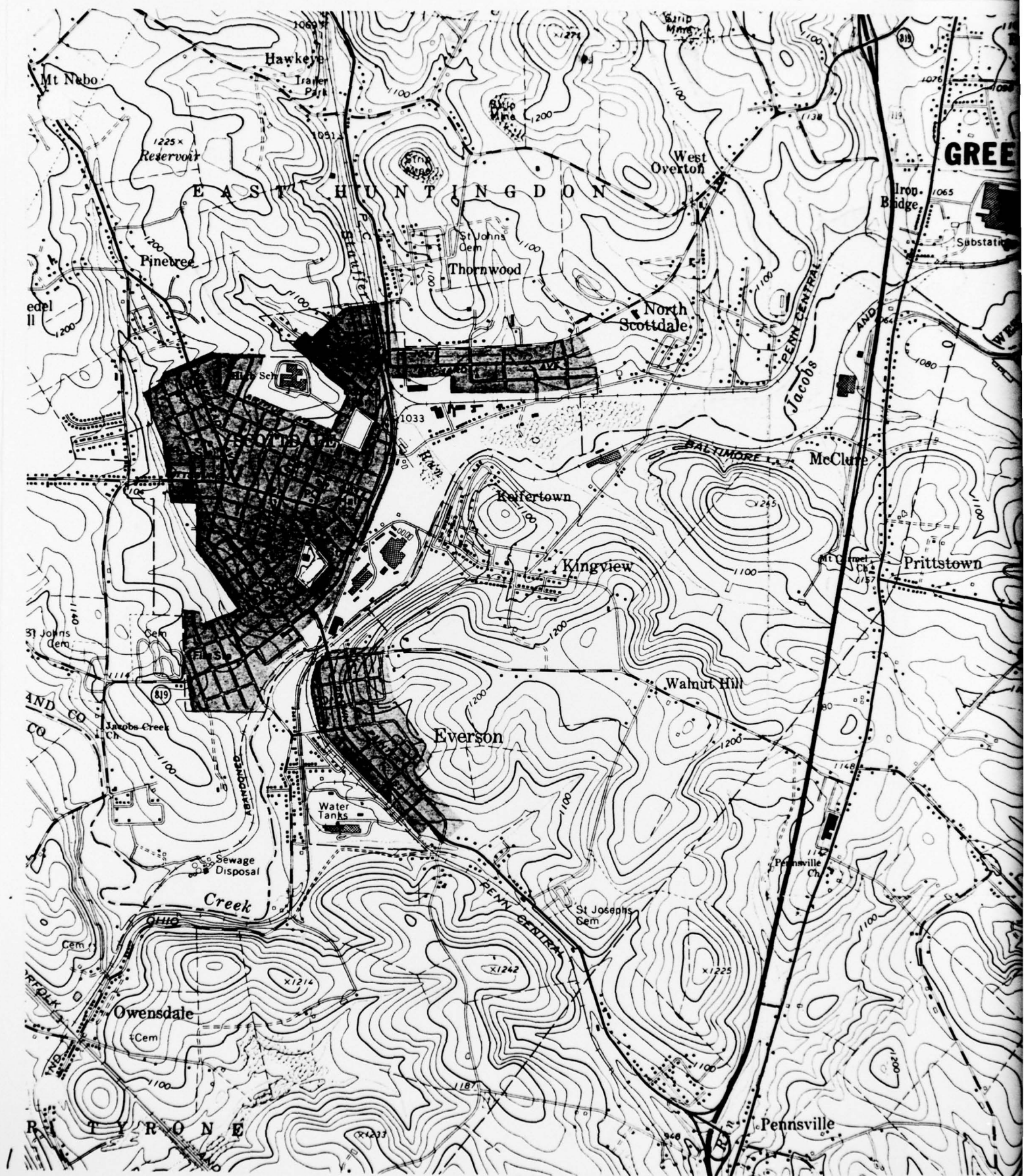
Designed	Date	Approved by
Drawn R. A. STALTER	9-71	Title
Traced	Sheet	Drawing No
Checked <i>John A. Graham</i>	No 18 of 37	PA-656-P

SCS-313B (APRIL 1963)

2

APPENDIX G
REGIONAL VICINITY MAP .

68





CONNELLSVILLE, PA.

N4000-W7930/7.5

1964

PHOTOREVISED 1973

AMS 5064 II SE-SERIES V831